

The Importance of the Peritraumatic Experience in Defining Traumatic Stress

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In the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev., *DSM-IV-TR*; American Psychiatric Association, 2000), posttraumatic stress disorder (PTSD) Criterion A2 stipulates 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. In considering this criterion, we describe its origins, review studies that have examined its predictive validity, and reflect on the intended purpose of the criterion and how it complements the mission of the *DSM*. We then assert that the predictive validity of Criterion A2 may not be an appropriate metric for evaluating its worth. We also note that the current Criterion A2 may not fully capture all the salient aspects of the traumatic stress response. To support this claim, we review empirical research showing that individuals adapt to extreme environmental events by responding in a complex and coordinated manner. This complex response set involves an individual's appraisal regarding the degree to which the event taxes his or her resources, as well as a range of other cognitions (e.g., dissociation), felt emotions (e.g., fear), physiological reactions (e.g., heart rate increase), and behaviors (e.g., tonic immobility). We provide evidence that these response components may be associated with the subsequent development of PTSD. We then describe the challenges associated with accurately assessing an individual's traumatic stress response. We conclude with a discussion of the need to consider the individual's immediate response when defining a traumatic stressor.

Keywords: PTSD, trauma, peritraumatic emotions, appraisals, peritraumatic behaviors

The *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev., *DSM-IV-TR*; American Psychiatric Association [APA], 2000) characterizes posttraumatic stress disorder (PTSD) as the result of exposure to an event involving a serious threat of injury or death or to the physical integrity of oneself or others. This event must also prompt the individual to respond with extreme fear, helplessness, or horror. The *DSM-IV-TR* subsequently indicates that an individual who experiences such a traumatic event and who endorses at least one Criterion B (reexperiencing) symptom, three Criterion C (avoidance and numbing) symptoms, and two Criterion D (hyperarousal) symptoms and who meets both Criteria E (duration longer than 30 days) and F (disturbance causes distress or impairment in functioning) can be diagnosed with PTSD (APA, 2000).

The *DSM-IV-TR*'s current definition of what constitutes a traumatic stressor is dependent on both the nature of the event (Cri-

terion A1) and the individual's subjective response during the event (Criterion A2). However, the inclusion of a subjective component in the definition of a traumatic event has received various criticisms. Some critics have suggested that Criterion A2 should be removed from the diagnostic criteria for PTSD because it is not sufficiently predictive of PTSD diagnostic status (e.g., Breslau & Kessler, 2001; Schnurr, Spiro, Vielhauer, Findler, & Hamblen, 2002). Others have criticized the manner in which Criterion A2 is currently defined because it includes only fear, helplessness, and horror and excludes other peritraumatic reactions (e.g., dissociation, disgust, anger; e.g., Brewin, Andrews, & Rose, 2000; Brunet et al., 2001; First, 2005; Roemer, Orsillo, Borkovec, & Litz, 1998; Weathers & Keane, 2007). These arguments have created doubt as to whether PTSD Criterion A should include a subjective component and, if so, how it should be constituted.

The current article addresses the question of whether the definition of traumatic stress benefits from the inclusion of a subjective component. We begin by describing the evolution of *DSM* PTSD Criterion A2 and review the results of studies that have examined its predictive validity. Next, we consider whether the predictive value of the subjective component is an appropriate metric for evaluating its worth. We consider both the intended purpose of the criterion and how it complements the overall mission of the *DSM*. We then review findings from the empirical literature that demonstrate that an individual's response to a potential traumatic stressor is broader than what is currently described by the *DSM*. Specifically, an individual's response includes appraisals and other cognitions, emotions, physiological reactions, and passive and active behaviors. We also detail studies that have examined the relations among each of these reactions and the subsequent development of PTSD. We then address the chal-

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enges associated with accurately assessing an individual's peritraumatic response. The article concludes with a discussion of the notion that the individual's response is necessary for properly defining a traumatic stressor.

Historical Antecedents and the Development of A2

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 the objective characteristics of the event 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 this stressor is subjectively experienced. Instead, the definition focused on whether the event was an "objective" stressor by invoking a normative standard (although Weathers & 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.

The PTSD work group on the fourth edition of the *DSM (DSM-IV)* deliberated over whether Criterion A should maintain its focus on the objective characteristics of the event or whether the definition of a traumatic stressor should explicitly include an individual's subjective response (Davidson et al., 1996). One of the work group's initial proposals for the subjective component of Criterion A was that "the person's response involved intense fear, distress, helplessness or horror" (Davidson et al., 1996, p. 597). Kilpatrick et al. (1998) conducted a field trial to collect empirical data regarding the impact of alternative versions of Criterion A on PTSD prevalence rates. The five proposed Criterion A alternatives varied in their definitions of the objective and subjective components of the traumatic stressor such that one definition did not include Criterion A, two definitions examined only variations of the objective component, and two definitions included variations of both an objective and subjective component. The authors assessed participants in the field trial with a series of structured interviews. They collected data on lifetime history of "high-magnitude stressor events" (e.g., sexual assault, combat), identification of up to three "index events" (i.e., the first or only high-

magnitude event, the most recent high-magnitude event, and the worst high-magnitude event), and objective and subjective characteristics of each index event. In addition, they interviewed participants about low-magnitude stressor events (e.g., chronic illness, relationship conflicts). Following this, the authors asked participants to select one stressor event that they considered the most serious or worst and then rate the objective and subjective characteristics of this event on various dimensions. Finally, the authors assessed participants for PTSD.

Kilpatrick et al. (1998) 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 (added across up to three high-magnitude events) on each of the five factors, compared with those who did not meet PTSD diagnostic criteria (all F s significant at the $p < .001$ level; Kilpatrick et al., 1998). These findings suggested that during exposure to a high-magnitude event, individuals may experience different peritraumatic reactions. Further, the more intense the peritraumatic reaction, the more likely the individual would subsequently meet criteria for PTSD.

The investigators also examined how each of the five alternative definitions of Criterion A affected PTSD prevalence rates for seven versions of Criteria B-E. They found that prevalence rates of PTSD did not differ by more than 3 percentage points for any of the seven versions of Criteria B-E regardless of which version of Criterion A was used. The authors of the field trial argued that few people develop PTSD unless they have experienced extremely stressful life events. Further, they proposed that

[t]he fact that there was so little variation in PTSD rates across different criterion A definitions, irrespective of whether or not the definition included a requirement for subjective emotional reactions of fear, helplessness, or horror, indicates that people who have experienced these events and develop PTSD are also likely to have subjective emotional reactions of distress on exposure to this class of events. (Kilpatrick et al., 1998, p. 831)

Subsequently, the *DSM-IV* adopted the current version of Criterion A (i.e., a positive endorsement of exposure to an A1 event and an A2 subjective distress response).

Notably, the *DSM-IV* work group never clearly specified its reasons for defining Criterion A2 in its current form (i.e., including only fear, helplessness, and horror while excluding other viable reactions that were identified during the field trial). The authors of the field trial simply stated that

[t]he fact that different criterion A definitions produced similar PTSD rates suggests that the decision concerning which criterion A to select

for *DSM-IV* can be made on the basis of instructional utility and clarity to the mental health field rather than on the basis of what happens to PTSD prevalence with different criterion A definitions. (Kilpatrick et al., 1998, p. 831)

Kilpatrick et al. (1998) then further suggested that one distinct advantage of including intense fear, helplessness, or horror as a requirement for Criterion A is that doing so would provide a richer description of the stressor criterion. On the other hand, Kilpatrick et al. noted that a disadvantage of including fear, helplessness, and horror in Criterion A is that they may not be immediately present in certain cases (e.g., childhood sexual abuse, combat). In such instances, these events would not qualify as traumatic stressors. The authors suggested that some ways to remedy this problem include incorporating a delayed onset specification or adding emotional numbing as a valid A2 experience (Kilpatrick et al., 1998). Ultimately, however, *DSM-IV* never adopted these suggestions (APA, 1994).

Importantly, the version of Criterion A2 adopted by *DSM-IV* was not one of the versions tested in the field trial. The closest approximation tested in the field trial examined whether, in response to a traumatic event, “the person *either* [emphasis added] reported an initial response . . . that included four or more emotional/physiological reactions sufficient to meet criteria for a panic attack or had the emotional response of helplessness in response to [the event]” (Kilpatrick et al., 1998, p. 824). Although this definition includes helplessness, it is otherwise inconsistent with the current version of A2.

Empirical Research on Criterion A2

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 association between the current version of A2 and PTSD diagnostic status with mixed results. Roemer, Orsillo, et al. (1998) examined the degree to which fear, helplessness, and horror was associated with exposure to traumatic and nontraumatic stressors among a sample of college undergraduates and found that individuals who experienced PTSD Criterion A1 traumatic stressors were more likely to report experiencing fear, helplessness, and horror than individuals who experienced nontraumatic stressors. It is interesting that the authors found that only helplessness was related significantly to all three PTSD symptom clusters. The cross-sectional, retrospective nature of this investigation, however, precludes 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.

Creamer, McFarlane, and Burgess (2005) retrospectively examined the prevalence of peritraumatic fear and helplessness and the association of these peritraumatic emotions with current levels of psychopathology among a national sample of individuals aged 18 and older collected by the Australian Board of Statistics. The authors found that only nine out of 158 individuals (approximately 5% of the sample) who met criteria for PTSD Criterion A1 and Criteria B–F did not report experiencing fear or helplessness peritraumatically. Of these nine individuals, five reported no memory of the event at all. Because only four individuals (approximately 2% of the sample) with a memory of the event subse-

quently developed PTSD symptoms without experiencing fear or helplessness peritraumatically, the authors suggested that an event must be subjectively experienced in one of these two ways before the individual develops other symptoms of PTSD. Again, however, the cross-sectional study design precludes any definitive conclusions about the directionality of the relation between A2 and PTSD diagnostic status.

Marmar et al. (2006) also examined the relation between A2 and the subsequent development of PTSD symptoms. Specifically, Marmar et al. found that a composite measure of peritraumatic fear, helplessness, and horror was correlated with PTSD symptoms for police officers both early in their careers and midcareer. Officers who scored higher on this composite measure during their worst duty-related incident also reported having more severe PTSD symptoms. Pole, Kulkarni, Bernstein, and Kaufmann (2006) confirmed this relation for postretirement police officers as well. However, because these authors did not separate fear, helplessness, and horror from one another, the degree to which each of these discrete reactions was associated with PTSD symptom severity remains unclear.

Brewin et al. (2000) 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, 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 et al., 2002). Breslau and Kessler (2001) interviewed a representative community sample to examine the effects of the revised stressor criterion (from *DSM-III-R* to *DSM-IV*) on estimates of trauma exposure and PTSD. The authors found that Criterion A2 did limit the number of potentially traumatic events described by A1. However, the inclusion of the A2 criterion did not improve the identification of events that led to PTSD. On the basis of these findings, the authors argued that A2

may not provide any incremental validity to the prediction of PTSD diagnostic status over and above PTSD Criterion A1 and thus may be unnecessary to include as part of the PTSD diagnosis.

Schnurr et al. (2002) examined lifetime trauma exposure among a sample of 436 male military veterans from both World War II and the Korean conflict and found that the inclusion of Criterion A2 reduced the prevalence of traumatic events that the sample reported. Specifically, when the authors assessed only PTSD Criterion A1, 96% of the sample reportedly experienced a traumatic event. However, when the authors included Criterion A2 in the assessment, the percentage of individuals who satisfied both PTSD Criterion A1 and A2 dropped to 79%. Similar to Breslau and Kessler (2001), the authors found that Criterion A2 had no effect on the prevalence of PTSD despite this reduction in the prevalence of trauma exposure. One percent of the sample had a current PTSD diagnosis, and 1.5% met diagnostic criteria for lifetime, but not current, PTSD using both Criteria A1 and A2 (Schnurr et al., 2002). The authors reported if they had not required participants to meet Criterion A2, these percentages would not have changed. It is interesting that although the inclusion of Criterion A2 did not affect diagnostic prevalence, individuals who endorsed both PTSD Criteria A1 and A2 reported higher PTSD symptom severity scores than individuals who endorsed only PTSD Criterion A1 but not A2.

How can studies that support the claim that Criterion A2 does not affect PTSD prevalence (e.g., Breslau & Kessler, 2001; Kilpatrick et al., 1998; Schnurr et al., 2002) be reconciled with Brewin et al.'s (2000) finding that Criterion A2 predicts PTSD? 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).

Should Peritraumatic Experiences Be Included Among the Diagnostic Criteria for PTSD?

Although Criterion A2 may demonstrate poor PPV, it is important to consider the possibility that the PPV value of A2 may not necessarily be the correct manner in which to establish its importance. It is unclear why Criterion A2 is held to the standard of requiring a high PPV when other components of the PTSD diagnosis are not. For example, past research has shown that most individuals who are exposed to an event that meets criteria for PTSD Criterion A1 do not develop PTSD, and some research has identified a nonlinear dose-response association between event magnitude and PTSD symptom severity (Bowman, 1997; Bowman & Yehuda, 2004; Ozer, Best, Lipsey, & Weiss, 2003). Several epidemiological studies (e.g., Breslau, Davis, Andreski, & Peterson, 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995)

and a meta-analysis (e.g., Ozer et al., 2003) have provided evidence that Criterion A1 events often do not produce PTSD. In addition, research has found that individuals can develop PTSD symptoms without experiencing a Criterion A1 event (e.g., Bodkin, Pope, Detke, & Hudson, 2007; Burstein, 1985; Dattilio, 2004; Dreman, 1991; Gold, Marx, Soler-Baillo, & Sloan, 2005; Olde, van der Hart, Kleber, & van Son, 2006; Simons & Silveira, 1994; Solomon & Canino, 1990). Although Rosen and Lilienfeld (2008) noted that many of these studies relied on PTSD symptom checklists and, as a result, may confuse normal reactions with symptoms of the disorder (e.g., Lees-Haley, Price, Williams, & Betz, 2001), they also contended that these studies call into question the contribution of Criterion A events in the development of PTSD.

Similarly, there is no current consensus with regard to the relative prevalence or the predictive power of the 17 cardinal symptoms of PTSD. Although some researchers have found a sense of foreshortened future to be associated with greater overall PTSD severity (Palm, Strong, & MacPherson, 2009), others have reported that intrusive recollections and exaggerated startle (Creamer, 1989) or avoidance of thoughts and feelings (Foa, Riggs, & Gershuny, 1995) are the most frequently endorsed PTSD symptoms. There is similarly no consensus regarding the relative prevalence or the predictive power of the PTSD symptom clusters. Some researchers have found the hyperarousal symptom cluster to best predict subsequent PTSD onset (e.g., O'Donnell, Elliot, Lau, & Creamer, 2007; Schell, Marshall, & Jaycox, 2004; Solomon, Horesh, & Ein-Dor, 2009), but others have found that the reexperiencing (Rasmussen, Smith, & Keller, 2007) and avoidance and numbing symptom clusters (Foa et al., 1995; Kopel & Friedman, 1997; R. D. Marshall et al., 2006) are most predictive of current PTSD. Despite the fact that there appears to be a lack of consensus regarding the predictive value of each of these symptoms and symptom clusters, they have not received the same level of criticism that Criterion A2 has for not demonstrating uniformly high PPV in the prediction of PTSD diagnostic status.

Another important consideration in this discussion about the use of PPV as an indicator of the value of Criterion A2 is that research has shown that peritraumatic distress severity may display considerable positive predictive value when it serves as a proximal predictor of acute PTSD (Birmes et al., 2005) but may show low PPV when it more distally predicts chronic PTSD (e.g., Breslau & Kessler, 2001; Schnurr et al., 2002). Because most studies have examined the predictive value of the peritraumatic experience with chronic PTSD cases and because many individuals remit from their initial PTSD symptoms within 1 year (e.g., E. B. Blanchard et al., 1997), this may at least partly explain why the majority of studies have not found the peritraumatic experience to be positively predictive of PTSD.

Although we cannot be completely certain of what purposes the *DSM-IV* work group intended for Criterion A2 when it added it to the PTSD diagnosis, we can assume that the work group never intended for Criterion A2 to be included for its PPV simply because the *DSM-IV* field trial found no association between the various versions of Criterion A2 and the relative prevalence of PTSD. It is possible that the *DSM-IV* work group included Criterion A2 to ensure that Criterion A was sufficiently serving a gatekeeper function (Davidson & Foa, 1991). However, PPV is not the best metric for evaluating Criterion A2's gatekeeping value. To properly assess this, researchers instead need to examine whether

Criterion A2 further restricts the number of individuals who are let through the “trauma-exposed gate” and subsequently given additional consideration for a PTSD diagnosis. Past research has already shown that Criterion A2 may indeed be performing in this capacity. Specifically, Breslau and Kessler (2001) found that only 76.6% of Criterion A1 events also involved subjective reactions specified by Criterion A2. Schnurr et al. (2002) also found that only 79% of veterans who experienced a Criterion A1 event also experienced a subjective response specified by Criterion A2. This suggests that Criterion A2 may work with Criterion A1 to help to avoid an overly broad conceptualization of trauma (referred to as “conceptual bracket creep,” McNally, 2003; or “criterion creep,” Rosen & Lilienfeld, 2008).

As already mentioned, following the *DSM-IV* field trial, Kilpatrick et al. (1998) noted that including fear, helplessness, and horror provided a richer description of the stressor criterion. Given this statement, perhaps the *DSM-IV* work group simply included Criterion A2 to be consistent with the stated official purpose of the *DSM-IV* to “provide clear descriptions of diagnostic categories in order to enable clinicians and investigators to diagnose, communicate about, study, and treat people with various mental disorders” (APA, 2000, p. xxxvii). In this regard, Criterion A2 serves a most important purpose: namely, to accurately describe the phenomenological experience during exposure to a traumatic stressor. However, because previous studies have shown that responses to high-magnitude experiences include a complex combination of cognitions, emotions, physiological responses, and behaviors (e.g., Bernat, Ronfeldt, Calhoun, & Arias, 1998; Brunet et al., 2001; Kaysen, Morris, Rizvi, & Resick, 2005; Kilpatrick et al., 1998; Olf, Langeland, Draijer, & Gersons, 2007; Olf, Langeland, & Gersons, 2005; Rizvi, Kaysen, Gutner, Griffin, & Resick, 2008; Scherer, 1984, 1986, 2001, 2004, 2009; Selkin, 1978; Sims & Sims, 1998), the current version of Criterion A2 may not fully capture the salient aspects of the peritraumatic experience. In other words, Criterion A’s current conceptualization of the individual’s response to the stressor is incomplete and provides inadequate information to mental health professionals about what one’s traumatic stressor response might encompass.

Reconsidering an Individual’s Peritraumatic Experience

In contrast to the current conceptualization of the subjective component of PTSD Criterion A (i.e., Criterion A2), the empirical literature suggests that an individual’s response to an environmental stressor is not restricted to a narrow class of potential reactions. Instead, empirical research has shown that an organism responds in a complex and coordinated manner that is meant to promote the adaptation of that individual. This entire set of reactions comprises the traumatic stress response (see Figure 1). According to our model, the initial response to an environmental stressor is an appraisal. The appraisal is then followed by an emotional reaction. The emotional reaction involves an integration of subjective emotions, additional cognitions, and physiological responses. Because various types of appraisals during an environmental stressor are possible, an individual may generate a number of emotional reactions during the experience. In turn, the nature of the emotional experience then influences subsequent peritraumatic behaviors that may be either passive or active.

The literature examining the relationship between the peritraumatic experience and the subsequent development of PTSD also supports an expanded view of the peritraumatic experience. However, these experiences need not be perfectly predictive of PTSD to support our contention that this broader conceptualization of the response to the traumatic stressor provides clarity and accuracy to the definition. To the contrary, although we argue that a clear and precise version of Criterion A2 should help to better identify which individuals have experienced a traumatic stressor, only a subset of these individuals will be diagnosed with PTSD. As such, although these responses should be associated with PTSD, we would not expect them to be perfectly predictive of the diagnosis. The sections that follow review the literature on different peritraumatic responses (i.e., appraisals, subjective emotions, additional cognitions, physiological reactions, peritraumatic behaviors) that are in line with our broader conceptualization of traumatic stress.

Appraisals

Prior research has suggested that the stress response begins with an appraisal of the significance of the event and how it may affect the individual (Clore & Ortony, 2000; Lazarus, 1991a, 1991b, 1991c; Scherer, 2004, 2009). PTSD Criterion A1 acknowledges that an individual’s evaluation, or appraisal, of the event is important for establishing whether an event is traumatic. Specifically, Criterion A1 notes that the event should involve “actual or *threatened* [emphasis added] death or serious injury, or a *threat* [emphasis added] to the physical integrity of self or others” (APA, 2000, p. 467). Although this definition implies that an individual must appraise whether death, serious injury, or physical integrity is being threatened, Criterion A1 does not adequately describe the nature of the appraisals being made. Therefore, the importance of appraisal in shaping the peritraumatic response is minimized. Lazarus and Folkman (1984) have stated that “[p]sychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p. 19). Recent theorists have echoed this emphasis on appraisal in defining stress and responses to it (e.g., Clore & Ortony, 2000; Lazarus, 1991a, 1991b, 1991c; Scherer, 2004, 2009). According to appraisal researchers, appraisals reflect the unique and changing relationship between a person and his or her environment. It is a process by which an event or encounter is categorized with respect to its significance for well-being. As such, it is an evaluative process. Further, it is thought to take place continuously (e.g., Lazarus & Folkman, 1984) and often occurs in an automatic, unconscious, and effortless fashion (e.g., Clore & Ortony, 2000; Scherer, 2009).

Appraisal theorists have contended that there are different types of appraisals. Lazarus and Folkman (1984) differentiated between primary appraisals (i.e., an evaluation of what is at stake) and secondary appraisals (i.e., an evaluation of what coping options are available). In contrast, Scherer (1984, 1986, 2001, 2004, 2009) hypothesized that there are four types of appraisals made during an encounter. The first type, relevance appraisals, focuses on the relevance of the event for the individual as well as for his or her social reference group. The second type, implications appraisals, determines how the event may affect the individual’s well-being and his or her short- and long-term goals. For the third type, coping potential appraisals, the individual assesses how well he or she can

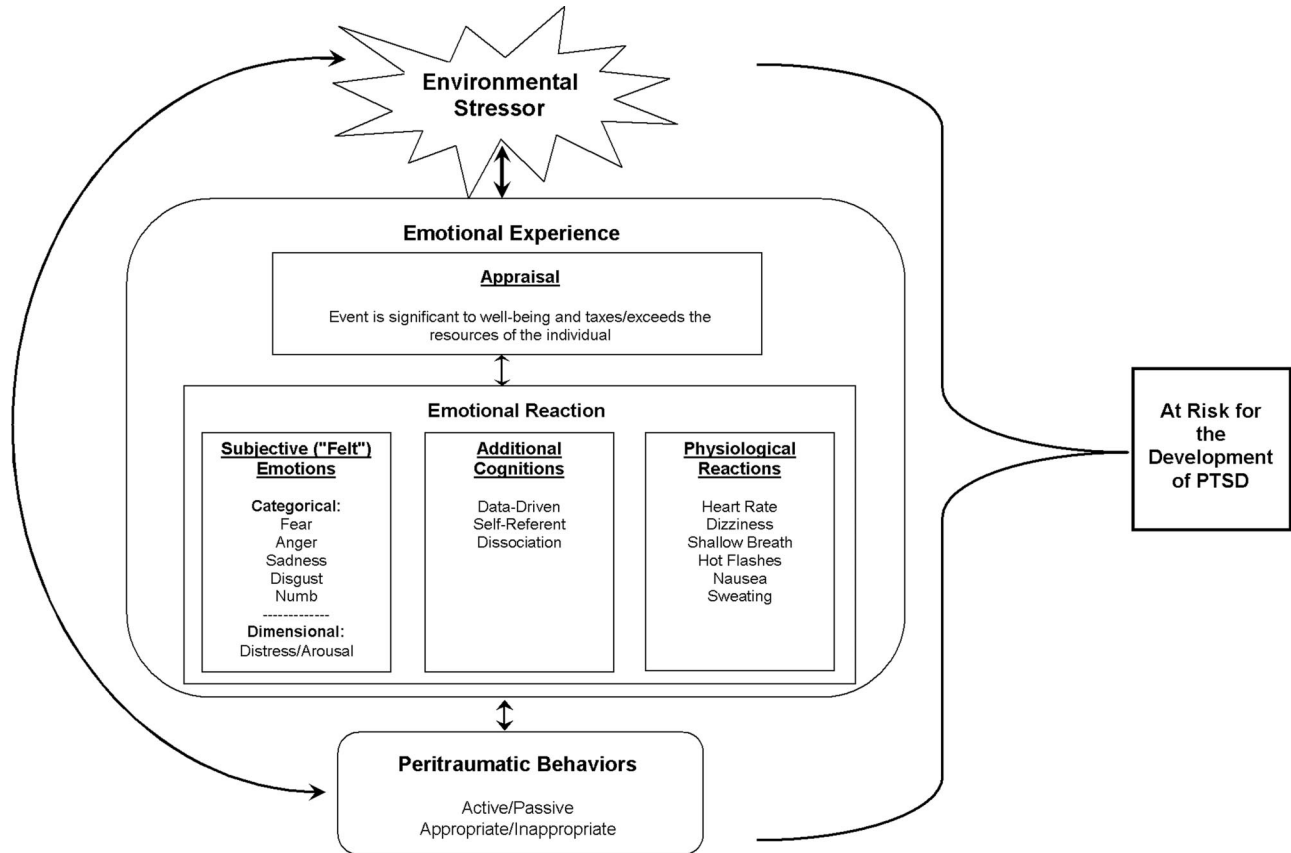


Figure 1. Schematic representation of the interacting objective and subjective components of traumatic stress and their relation to posttraumatic stress disorder (PTSD). Arrows represent the interactive nature of the model; each component can influence each of the other components. Only empirically supported reactions are presented here; other reactions are potentially relevant.

cope with or adjust to the consequences of the event. The fourth type, normative significance appraisals, determines the significance of the event in terms of the individual's self-concept as well as in terms of social norms and values. Scherer has further maintained that these appraisals are performed in the aforementioned sequence, and empirical studies have supported this claim (e.g., Aue, Flykt, & Scherer, 2007; Delplanque et al., 2009; Grandjean & Scherer, 2008; Lanctôt & Hess, 2007; Scherer, 1999). Although theorists have differed in their conceptualization of the specific forms of appraisals, they agree on two points: Appraisals are a necessary component of the stress response, and they involve both an evaluation of the relevance of the stressor and a consideration of whether resources are available to cope with it.

In contrast to earlier notions that an individual must process all information from the environment before an emotional experience can be initiated, more recent theories have suggested that we do not postpone our evaluations of incoming environmental cues until after they have been completely processed. Rather, we respond early in the processing sequence to partial cues. As new information is available, we generate new appraisals and coordinate new responses. Scherer (1984, 1986, 2001, 2004, 2009) has suggested that although we process appraisal objectives sequentially, the process itself is recursive. As such, checks for each appraisal

objective repeat continuously, which results in a constant updating of the appraisal results. This is consistent with Lazarus and Folkman's (1984) conceptualization of reappraisal. As such, theorists agree that during any given event, the individual's subjective emotions, action tendencies, and physiological reactions will change as new information is gleaned.

Despite the fact that Criterion A1 inadequately describes the importance of an individual's appraisal of an event, its significance is duly noted by existing theories of PTSD. In their model, Ehlers and Clark (2000) proposed that an individual's appraisal of an event as involving a serious, current threat contributes to the subsequent development of chronic PTSD. Previous research showing that negative appraisals of the trauma predict PTSD chronicity and severity (e.g., Dunmore, Clark, & Ehlers, 1997, 1999, 2001; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) have supported this hypothesis. Foa and her colleagues (Foa & Kozak, 1986; Foa & Riggs, 1993) and Brewin, Dalgleish, and Joseph (1996) have also emphasized the importance of an individual's attributions and interpretations of the traumatic event in the development of PTSD. These claims have also received empirical support (e.g., Agar, Kennedy, & King, 2006; Ehlers, Mayou, & Bryant, 1998; Evans, Ehlers, Mezey, & Clark, 2007; Halligan, Michael, Clark, & Ehlers, 2003).

In terms of the mechanism through which peritraumatic appraisals contribute to the development of PTSD, Olff and her colleagues (Olff et al., 2007, 2005) provided evidence that peritraumatic threat appraisals affect the individual's neuroendocrine response. Specifically, in their review, Olff et al. (2007) reported that individuals who did not make an initial threat appraisal during an event displayed a dampening of the physiological stress response (e.g., Levenson, Sher, Grossman, Newman, & Newlin, 1980; Sayette, 1993). Further, they noted that these individuals were less likely to develop PTSD than those who did make such an appraisal (e.g., A. Adler, 1943; Chemtob et al., 1998; Ladwig et al., 1999; Mellman, Ramos, David, Williams, & Augenstein, 1998; O'Brien & Nutt, 1998).

Also highlighting the importance of appraisal, research has provided evidence that threat appraisal (i.e., the perception of threat) is often a better predictor of PTSD symptoms than objective measures of danger (e.g., Bernat et al., 1998; Ehlers et al., 1998; King, King, Gudanowski, & Vreven, 1995; Ullman & Filipas, 2001). For instance, in a study examining responses to the "most stressful" event reported by 937 college students, Bernat et al. (1998) obtained information regarding objective and subjective peritraumatic characteristics, as well as PTSD criteria. The authors found that unlike receipt of injury, perceived life threat was significantly correlated with PTSD symptoms. These findings lend further support to our contention that an individual's appraisal is important in defining what constitutes a traumatic event.

Peritraumatic Emotions

Four primary emotions may be associated with exposure to a potentially traumatic stressor. These emotions are fear, anger, sadness, and disgust. Theorists have referred to these four emotions as primary emotions because they are assumed to be universally present in humans and homologous in animals, and have been opted for over the course of evolution (e.g., Barrett, 2006; Demoulin et al., 2004). Each of these emotions is associated with a different appraisal. Specifically, Power and Dalgleish (1997) found that fear was associated with the appraisal of threat; anger was associated with the appraisal that a perceived other agent was blocking or frustrating a goal; sadness was associated with the appraisal of loss or failure; and disgust was associated with the appraisal of association with an unwanted, repulsive object. Hypothetically, any of these appraisals could be made during an extreme environmental stressor. We discuss fear, anger, sadness, and disgust in turn, noting the literature supporting both their presence during a potentially traumatic event and their associations with the subsequent development of PTSD.

Fear. The choice of fear for inclusion in the current A2 criterion appears to be well supported by the literature. A number of studies have found that peritraumatic fear is common during traumatic events (Breslau & Kessler, 2001; Creamer et al., 2005; Kilpatrick et al., 1998; Roemer, Orsillo, et al., 1998; Schnurr et al., 2002). There is also some support for the relationship between fear and PTSD (Breslau & Kessler, 2001; Creamer et al., 2005; Kilpatrick et al., 1998; Schnurr et al., 2002), although some studies have failed to find this association (e.g., Roemer, Orsillo, et al., 1998). Further support for the relationship between peritraumatic fear and PTSD comes from examining research on brain substrates implicated in causing and maintaining the disorder. Research has

shown that the amygdala, the medial prefrontal cortex (mPFC), and the hippocampus all appear to play an important role in the pathophysiology of PTSD (e.g., Elzinga & Bremner, 2002; Shin, Rauch, & Pitman, 2005; van der Kolk, 2001; Weiss, 2007). Under normal circumstances, the amygdala evaluates incoming information for emotional significance (van der Kolk, 2001). The amygdala is regulated by the prefrontal cortex, which filters out unessential stimuli and inhibits responses to sensory input so that homeostasis is maintained (Weiss, 2007). After the amygdala assigns meaning to sensory information, it guides emotional behavior through its projections to several brain regions, including the hippocampus (van der Kolk, 2001). The hippocampus then creates a cognitive map that allows for the categorization of the experience.

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. Specifically, PTSD reexperiencing and hyperarousal symptoms are associated with overactivation of the amygdala and underactivation of the PFC, whereas PTSD avoidance and numbing symptoms are associated with underactivation of the hippocampus and the PFC (Weiss, 2007). The brain regions associated with the development of PTSD have also been linked to the experience of fear. For example, empirical research has shown that the amygdala is involved in the assessment of threat-related stimuli (e.g., processing fearful faces) and in fear conditioning (Büchel, Morris, Dolan, & Friston, 1998; LaBar, Gatenby, Gore, LeDoux, & Phelps, 1998; LeDoux, 1996; Shin et al., 2005). Further, research has implicated the mPFC in fear extinction and retention (Quirk, Garcia, & González-Lima, 2006; Shin et al., 2005) and the hippocampus in defensive responding (Machado & Bachevalier, 2008; Shin et al., 2005). As such, the literature supports a relationship between these brain substrates and both fear and PTSD. Further, the literature suggests that it may be the experience of fear (and the brain substrates involved in this experience) that is implicated in the later development of PTSD.

The amygdala, the mPFC, and the hippocampus may be associated with the experience of other emotions as well. The empirical literature provides some support for this contention. Specifically, increased amygdala activation is associated with the processing of not only fear-related stimuli but also anger-related, sadness-related, and disgust-related stimuli (e.g., Costafreda, Brammer, David, & Fu, 2008; Kédia, Berthoz, Wessa, Hilton, & Martinot, 2008; Schienle, Schäfer, Stark, Walter, & Vaitl, 2005; Wang, McCarthy, Song, & LaBar, 2005). Research has also found that high levels of amygdala activation associated with a variety of affective stimuli can interfere with hippocampal functioning (Adamec, 1991; Squire & Zola Morgan, 1991). Further, PFC lesions have been associated with a general impairment in emotion regulation, not just for fear (Damasio, Grabowski, Frank, Galaburda, & Damasio, 1994). The fact that the biological substrates associated with PTSD are associated with emotions other than fear strengthens the possibility that an individual may experience a variety of emotions (e.g., anger, sadness, and disgust) during a potentially traumatic stressor.

Anger. A number of studies have reported that anger is a common peritraumatic reaction for active-duty military personnel and veterans (A. B. Adler, Wright, Bliese, Eckford, & Hoge, 2008), police officers (Sims & Sims, 1998), and survivors of

sexual assault (Resick, 2004). Further, studies have shown that anger is related to PTSD when assessed peritraumatically (e.g., Brewin et al., 2000), posttraumatically (e.g., Andrews, Brewin, Rose, & Kirk, 2000; Feeny, Zoellner, & Foa, 2000; Novaco & Chemtob, 2002; Riggs, Dancu, Gershuny, Greenberg, & Foa, 1992), and during trauma memory activation (e.g., Taft, Street, Marshall, Dowdall, & Riggs, 2007). Kilpatrick et al. (1998) identified anger as an important peritraumatic emotion; in the field trial, it was identified as part of the dysphoria factor. Although individual item correlations were not presented, Kilpatrick et al. reported that the dysphoria factor (comprising anger, disgust, and sadness) was significantly correlated with PTSD.

Further support for the relationship between peritraumatic anger and PTSD comes from studies suggesting that anger-inducing stimuli may activate the amygdala in a manner that is similar to fear-inducing stimuli. Kédia et al. (2008) conducted a study in which healthy participants underwent functional magnetic resonance imaging (fMRI) while imagining four situations: self-anger ("I harm myself"), guilt ("I harm someone"), other-anger ("someone harms me"), and compassion ("someone harms someone"). They found that of the four conditions, only guilt and other-anger were associated with amygdala activation. Notably, the authors did not ask participants to imagine a fearful scenario, so no comparison with fear could be made. Further, it is possible that both the guilt and other-anger scenarios were associated with threat appraisals, thereby activating the amygdala.

Sadness. Sadness is also a commonly reported peritraumatic reaction (Brunet et al., 2001; Sims & Sims, 1998). Kilpatrick et al. (1998) identified sadness as an important peritraumatic emotion; in the field trial, the authors categorized sadness as part of the dysphoria factor, which was significantly correlated with PTSD. Research has also suggested that peritraumatic sadness may play a role in the subsequent development of PTSD by activating the amygdala in a manner similar to peritraumatic fear. Wang et al. (2005) presented sad and neutral distractor images (matched on stimulus frequency, presence of human figures, and other visual features) to healthy participants and examined brain activation through functional imaging techniques. A pilot study first identified sad images; of these, only those images rated as sad by the fMRI study participants were used in analyses. Functional imaging results indicated that participants showed significantly greater amygdala activation to images they perceived as sad than to those they perceived as neutral. However, it is unclear whether the findings reflect participants' response to sadness as opposed to threat, because amygdala activation associated with sad imagery was not compared with activation associated with other types of emotionally evocative stimuli (e.g., fear), and it is possible that participants found the sad images threatening. A more recent study compared amygdala activation during sadness, happiness, fear, and anger. Although the authors found that anger and fear tended to be associated with more amygdala activation than sadness and happiness, all four emotions were associated with amygdala activation (Loughead, Gur, Elliott, & Gur, 2008).

Disgust. Another peritraumatic emotional response to be considered in a revised understanding of the traumatic stress response is disgust (e.g., Foy, Sippelle, Rueger, & Carroll, 1984; Selkin, 1978). The Kilpatrick et al. (1998) field trial identified disgust as part of the dysphoria factor, which was significantly correlated with PTSD. Further, several researchers have suggested that dis-

gust might influence the development of PTSD (e.g., Keane, Marshall, & Taft, 2006; Rosen & Lilienfeld, 2008). Although the Kilpatrick et al. field trial is the only study to examine the relationship of peritraumatic disgust and PTSD to date, several researchers have identified a significant relationship between disgust reported during trauma imagery procedures and PTSD symptomatology (e.g., Holmes, Grey, & Young, 2005; Olatunji, Babson, Smith, Feldner, & Connolly, 2009; Pitman et al., 1990; Shin et al., 1999). For example, Shin et al. (1999) found that women with a history of childhood sexual abuse and associated PTSD reported significantly more disgust during a trauma imagery task than women without PTSD. Although the authors measured disgust during an analogue experience (i.e., imagery presented after the trauma) rather than peritraumatically, their results in combination with the field trial provide promising support for a relationship between peritraumatic disgust and subsequent development of PTSD symptoms.

Functional imaging studies have also provided support for the relationship between peritraumatic disgust and PTSD. Specifically, research has shown that the neuroanatomical correlates of disgust seem to be similar to those of fear. In one study, healthy participants viewed "disgust" and "neutral" images selected from the International Affective Picture System and rated the images on the degree to which they experienced disgust and fear while viewing them using 9-point visual analogue scales (Schienle et al., 2005). The average disgust ratings for the disgust pictures was 6.4 ($SD = 2.5$), whereas the average fear ratings for the disgust pictures was 3.4 ($SD = 2.3$). Results of the analyses on the fMRI data indicated that similar to findings for fear pictures (e.g., Shin et al., 2005), disgust pictures activated both the amygdala and the mPFC. The authors concluded that the amygdala is involved not just in processing of fear-related cues but in processing of disgust-related cues as well. The low average fear ratings for the disgust images provide support for the specific role of disgust in activating the amygdala. The fact that the mPFC was activated during exposure may appear to contradict the argument that peritraumatic disgust is associated with the subsequent development of PTSD, because PTSD is associated with increased amygdala activation coupled with decreased mPFC and hippocampal activation. However, because the participants in this study were healthy volunteers, it is not surprising that their mPFCs functioned appropriately to dampen their amygdala activation to pictures of disgust.

Categorical versus dimensional approach to emotions. Although the literature identifies fear, anger, sadness, and disgust as potentially common peritraumatic responses, more work is needed to examine more fully the relations between these peritraumatic emotions and PTSD. Additional neuroimaging studies that examine the effect of other emotions (e.g., anger, sadness, disgust) while appropriately controlling for fear may provide clearer evidence of the role of each of these emotions during the traumatic stress response. However, rather than on the attempt to disentangle the effects of discrete emotion states, perhaps the focus should be on the underlying dimensions of all emotions.

The emphasis on categorical emotional states in the studies we have reviewed, thus far, 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, level of arousal may be the more important dimension in the conceptualization of peritraumatic emotions (e.g., Bedard-Gilligan & Zoellner, 2008; Brewin et al., 2000; Ozer and Weiss, 2004; Roemer, Orsillo, et al., 1998). Thus, a dimensional framework may more accurately reflect the traumatic stress response.

Several researchers have provided support for conceptualizing peritraumatic emotion from a dimensional perspective, particularly in terms of arousal. Rather than examine the presence of a particular categorical emotion, these researchers examined the intensity of a number of peritraumatic emotions by creating a composite variable (i.e., peritraumatic distress). Brunet et al. (2001) identified a significant relationship between peritraumatic distress (scored on a Likert scale from 0 = *not at all* to 4 = *extremely true*) and PTSD among both police officers and a nonpolice comparison group. This relation was significant even after controlling for peritraumatic dissociation. Further, in their meta-analysis, Ozer et al. (2003) found that peritraumatic emotional distress (including emotions such as fear, helplessness, horror, guilt, and shame) was among the strongest correlates of PTSD. 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 is not 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 our review of the brain substrates associated with the development of PTSD. Specifically, evidence has supported the hypothesis that stimuli that induce discrete emotional states are not processed by different parts of the brain; instead, empirical support has indicated that the same neuroanatomical substrates (e.g., the amygdala) are implicated in all emotion processing (Costafreda et al., 2008; Schienle et al., 2005). If so, it may not be important to determine exactly 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 amygdala becomes overactivated during the processing of the event.

Peritraumatic emotional numbing. One peritraumatic emotion that we have not yet discussed is emotional numbing. Several researchers have identified emotional numbing as a common peritraumatic experience (e.g., Resick, 2004; Roemer, Orsillo, et al., 1998; Sims & Sims, 1998). Brewin et al. (2000) suggested several reasons why peritraumatic emotional numbing may occur. For instance, victims may feel numb or dazed during the potentially traumatic event, which may attenuate the peritraumatic emotional intensity. It is also possible that the event may unfold too rapidly to allow for adequate processing by the individual. This might

result in the individual having limited or no awareness of his or her peritraumatic emotions.

Research has supported the idea that peritraumatic emotional numbing is associated with the development of PTSD. In their analysis of initial subjective reactions to the stressor event, Kilpatrick et al. (1998) found that the numbing–unreality factor accounted for more of the variance regarding the presence versus absence of lifetime PTSD than the cognitive–fear factor did (i.e., the factor including fear and helplessness; see Rubin, Berntsen, & Bohni, 2008, for the calculation of R^2 values for factor loadings). Kilpatrick et al. concluded that the recognition of emotional numbing as a common peritraumatic reaction might explain the development of PTSD when other emotional reactions are absent. Roemer, Orsillo, et al. (1998) also found a significant relationship between peritraumatic numbness and the development of PTSD symptomatology. In their study, numbing was modestly correlated with PTSD symptoms and uniquely predicted subsequent PTSD symptomatology beyond peritraumatic emotional responses.

As previously mentioned, following the *DSM-IV* field trial, Kilpatrick et al. (1998) suggested that the *DSM-IV* should either include emotional numbing as another possible peritraumatic experience or add a delayed onset specification for individuals who report that they initially felt numb during their stressor event but then subsequently experienced a recognized emotional response after the stressor had ended. However, the *DSM-IV* did not adopt either of these recommendations. Instead, Criterion A2 currently specifies only that “the person’s response involved intense fear, helplessness, or horror” (APA, 2000, p. 467), with no timing specification given. As a result, the prevalence and possible short-term utility of peritraumatic emotional numbing, in combination with its positive association with the development of PTSD symptoms, is problematic for the current version of Criterion A2. Moreover, there appears to be some confusion among researchers and clinicians about when an emotional response must occur in relation to the potentially traumatic event for it to be considered peritraumatic. In the *DSM-IV* field trial, Kilpatrick et al. (1998) asked participants to identify the emotions they felt during the trauma; these were considered peritraumatic emotions. Yet, the gold standard semistructured diagnostic interview for PTSD, the Clinician Administered PTSD Scale (Blake et al., 1995), asks individuals to describe the emotions they felt both during and after the potentially traumatic stressor, with the experience of intense fear, helplessness, or horror at either time point being acceptable for meeting criteria for Criterion A2. This approach is consistent with the field’s normative interpretation of peritraumatic experiences as those that occur either during or immediately after the traumatic event (e.g., Bedard-Gilligan & Zoellner, 2008). Adding further to the confusion is the fact that it is unclear what time frame “immediately after” the traumatic event exactly includes.

Although peritraumatic emotional numbing and the timing of the peritraumatic response pose significant problems for the current version of Criterion A2, these issues pose no difficulties for our broader conceptualization of the traumatic stress response. This is because, even if an individual reports feeling no subjective emotions (i.e., feeling emotionally numb) during the stressor exposure, other components of the traumatic stress response (e.g., cognitions, physiological reactions, behaviors) may be present and subsequently assessed. Thus, by broadening our conceptualization of the traumatic stress response, we need not consider responses

temporally outside the event itself. Consistent with this notion, previous research has found that other aspects of the stress response (e.g., physiological responding) are consistently present regardless of subjective reports of emotion. Specifically, Johnson (1974) categorized 40 participants into four groups based on differences in subjective experiences of pain during a cold pressor task. Results indicated that although subjective reports of pain differed among participants, physiological reactivity measures (i.e., blood pulse volume, skin temperature, and pulse rate) did not.

Additional Peritraumatic Responses

Theorists have suggested that emotions evolved to promote the survival of individuals and species (e.g., Bradley et al., 2001). Thus, emotions are innately functional in that they coordinate responses to contend with an object. From a functionalist perspective, emotions are considered to be adaptive responses to specific physical and social challenges and opportunities that are shaped by natural selection (Izard, 1977, 1992; Nesse & Ellsworth, 2009; Plutchik, 1980). Further, many have contended that these functional reactions evolved to coordinate other response patterns (e.g., subjective, cognitive, physiological, and behavioral patterns) to increase the ability of the individual to adapt to evolutionary challenges and environmental pressures (Cosmides & Tooby, 2000; Izard, 1992; Levenson, 1994; Nesse, 1990; Nesse & Ellsworth, 2009). As such, emotions can be viewed as a set of patterns, or components, that are each activated by both a common eliciting event and separate external conditions (e.g., habits; Frijda, 2000; Ortony & Turner, 1990; Scherer, 1992).

In keeping with the functional view of emotions, theorists have argued that the subjective “feeling” component is only “the visible tip of a huge iceberg” (e.g., Scherer, 2009, p. 1318). In fact, Scherer (2009) suggested that the entire emotional experience consists of three parts: (a) unconscious reflection and regulation (which includes cognitive appraisal, physiological symptoms, motor expression, and action tendencies), (b) conscious representation and regulation (i.e., subjective emotional feelings), (c) and verbalization and communication of emotional experience (which reflects the use of linguistic labels to describe the conscious part of feeling as well as the implications of the verbal description that may go beyond the content of the emotional experience). This model highlights the notion that the subjective experience of emotion is only one component of a much larger system. As such, these additional responses are important components of the traumatic stress response as well. We discuss evidence for each of these responses in turn.

Peritraumatic cognitions. We have already reviewed the importance of cognitive appraisals in the traumatic stress response. However, other peritraumatic cognitive processes may also be pertinent to this discussion, as they have also been shown to be related to the development of PTSD. Specifically, researchers have proposed that the overwhelming nature of a potentially traumatic stressor may result in disruptions in peritraumatic cognitive processing, which may confer risk for the subsequent development of PTSD (Brewin et al., 1996; Ehlers & Clark, 2000; Halligan et al., 2003; van der Kolk & Fisler, 1995). Empirical research has identified two types of cognitive processing styles that appear to be associated with the later development of PTSD. The first is the use of data-driven processing. Data-driven processing involves pro-

cessing surface-level information (i.e., sensory impressions and perceptual characteristics), rather than engaging in elaboration of contextual elements of an event (Halligan et al., 2003). The second is the lack of self-referent processing (i.e., the inability to process an experience with respect to the self and relate it back to autobiographical information; Halligan et al., 2003).

Researchers have implicated both the use of data-driven processing and a lack of self-referent processing at the time of the event in the later development of PTSD (Halligan et al., 2003; Murray, Ehlers, & Mayou, 2002). In a cross-sectional study of physical and sexual assault survivors, both peritraumatic data-driven processing and a lack of peritraumatic self-referent processing were related to disorganized trauma memories. In addition, peritraumatic cognitive styles were associated with PTSD over and above objective and subjective measures of assault severity (Halligan et al., 2003, Study 1). A prospective study replicated and extended these results (Halligan et al., 2003, Study 2). Specifically, in a different sample of assault victims, both peritraumatic data-driven processing and a lack of self-referent processing (measured within 3 months of the assault) were related to both concurrent and subsequent PTSD symptoms measured initially and 3 and 6 months later. The results of these studies suggest that certain types of peritraumatic cognitive processing may confer risk for the subsequent development of PTSD, and thus may be important to consider in an expanded version of the traumatic stress response.

Another important peritraumatic cognitive process that may occur during traumatic stress is dissociation. The term *dissociation* implies having divided access to awareness; that is, it is a state in which two or more mental processes or contents are not integrated, causing diminished awareness of emotions or thoughts (Gershuny & Thayer, 1999). A myriad of empirical studies have suggested that cognitive distortion in the form of peritraumatic dissociation is positively related to subsequent PTSD symptom severity. In their meta-analysis, Ozer et al. (2003) found that peritraumatic dissociation was the strongest correlate of PTSD symptom severity when assessed retrospectively. Empirical research has identified this association between peritraumatic dissociation and PTSD across a number of traumatized populations, including combat veterans (e.g., Bremner & Brett, 1997; Gershuny & Thayer, 1999; O’Toole, Marshall, Schurek, & Dobson, 1999; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996), survivors of motor vehicle accidents (e.g., Ehlers et al., 1998; Gershuny & Thayer, 1999), traumatic injury patients (e.g., Gershuny & Thayer, 1999; Shalev, Peri, Canetti, & Schreiber, 1996), assault survivors (e.g., Gershuny & Thayer, 1999; Resick, Churchill, & Falsetti, 1990; Rizvi et al., 2008), emergency service personnel involved in earthquake rescues (Marmar et al., 1999), and victims of natural disaster (e.g., Gershuny & Thayer, 1999). Thus, with a few notable exceptions (e.g., G. N. Marshall & Schell, 2002), the empirical literature overwhelmingly supports an association between retrospectively assessed peritraumatic dissociation and PTSD. Constructs related to dissociation (e.g., peritraumatic fright) have also been associated with the development of PTSD (e.g., Vaiva et al., 2003; Vaiva, Ducrocq, Cottencin, Goudemand, & Thomas, 2000).

Many researchers have argued that peritraumatic dissociation serves a self-protective function for trauma survivors (Bremner & Brett, 1997; Gershuny & Thayer, 1999; Moleman, van der Hart, & van der Kolk, 1992; van der Kolk, van der Hart, & Marmar, 1996). These researchers have argued that dissociation may allow an

individual to escape psychologically from horrifying or life-threatening situations in which actual physical escape is not possible. More specifically, it may allow the trauma sufferer to avoid conscious awareness of the full impact of what is happening, thus protecting the individual from experiencing intense peritraumatic emotions. In this sense, dissociation can be conceptualized as an emotion regulation strategy (Wagner & Linehan, 1998). Research has indicated that although dissociation may be an effective, short-term self-preservation strategy, it can be detrimental to long-term functioning (Bremner & Brett, 1997). In fact, its use over a long period may result in even greater trauma-related distress for the individual. This contention is supported by the consistent relation between peritraumatic dissociation and the subsequent development of chronic PTSD.

Peritraumatic physiological reactions. Another component of both the traumatic stress response in general and the emotional experience in particular is the individual's physiological response (e.g., facial expression, muscular tonus, voice, autonomic nervous system activity, endocrine activity; Levenson, 1994). A number of self-report studies have confirmed that these responses often occur during a potentially traumatic event and that they are highly correlated with PTSD. For example, in Kilpatrick et al.'s (1998) field trial, the panic-physiological arousal factor (which included a number of self-reported peritraumatic physiological reactions) explained the largest amount of variance (almost 40% of the 60% explained) of the five factors identified to explain reactions to high-magnitude stressors. Further, this factor was significantly correlated with PTSD. Several other researchers have identified a relationship between self-reported peritraumatic physiological arousal and PTSD as well (e.g., Bernat et al., 1998; Brunet et al., 2001; Tucker, Dickson, Pfefferbaum, McDonald, & Allen, 1997). Brunet et al. (2001) found that the self-reported occurrence and magnitude of sweating, shaking, and racing heart were positively associated with PTSD symptoms for a wide range of traumas among both police officers and civilians.

Direct (rather than self-report) measures have also supported the relation between peritraumatic physiological reactivity and PTSD. The majority of studies conducted have found that elevated heart rate directly measured shortly after exposure to a potentially traumatic event is predictive of the subsequent development of PTSD for both adults and children (e.g., Bryant, Creamer, O'Donnell, McFarlane, & Silove, 2008; Bryant, Harvey, Guthrie, & Moulds, 2000, 2003; Kassam-Adams, Garcia-España, Fein, & Winston, 2005; Nugent, Christopher, & Delahanty, 2006; Shalev & Freedman, 2005; Shalev et al., 1998). Although a few studies have found the opposite relationship between elevated heart rate and PTSD (e.g., E. B. Blanchard, Hickling, Galovski, & Veazey, 2002) or no relationship between heart rate and PTSD at all (e.g., Buckley et al., 2004), these contrary findings are most likely a product of methodological differences (e.g., small sample sizes and a limited number of recruitment sites; Bryant et al., 2008). In support of this contention, when Bryant et al. (2008) examined the relationship between initial heart rate and PTSD among 1,105 traumatized participants recruited from four hospital sites, they found that participants with elevated peritraumatic heart rates were significantly more likely to meet criteria for PTSD at 3 months than those without elevated heart rates. Although there is a limited amount of literature examining the relationship between PTSD and other peritraumatic physiological measures, there is some evidence to

suggest that these measures are also associated with PTSD (e.g., respiration rates; Bryant et al., 2008).

Peritraumatic behaviors. Traditionally, behaviors are not considered part of the emotional experience (e.g., Scherer, 2009). Despite this, we consider peritraumatic behaviors an important component of the traumatic stress response. One reason for this categorization is that an individual's peritraumatic emotional experience may motivate and organize behavioral response patterns (Cosmides & Tooby, 2000; Izard, 1992; Levenson, 1994; Nesse, 1990; Nesse & Ellsworth, 2009; Scherer, 2009). Further, an individual's peritraumatic behaviors may influence subsequent appraisals (e.g., Olf et al., 2007) or the event itself (e.g., resistance strategies may be effective in escaping a potential rape; Bart & O'Brien, 1984), therefore influencing the individual's peritraumatic emotional experience.

This theory of the dynamic interplay between the environmental demands, cognitive appraisals, emotions, and behaviors is consistent with other ideas about how an individual's defensive reflexes are organized. It is well established that nonhuman animals proceed through a series of sequential defensive reflexes in response to increasing proximity of a predator (e.g., R. J. Blanchard & Blanchard, 1989; Fanselow, 1994; LeDoux, 1996; Ratner, 1967). This sequence, known as the defense cascade model (Bradley & Lang, 2000; Lang, 1995; Lang, Bradley, & Cuthbert, 1997), consists of three stages. In the first (*preencounter*) stage, a predator has not yet been encountered and target specific defense behavior is not yet engaged. In the second (*encounter*) stage, a predator has been detected. Responses associated with this detection are freezing, focused attention and alertness, sustained cardiac deceleration, defensive analgesia, and potentiated startle. These responses help to minimize detection, orient the animal toward potential threat, and prepare it for action (see Gallup, 1977). Continued approach by the predator sets in motion a sequence of active defensive postures (e.g., flight or fight) that characterize the *postencounter*, or *circa-strike*, stage. Most prey will first attempt to escape. If escape is not possible, a prey animal will subsequently fight or resist. Responses associated with an active defensive posture may include potentiated startle and increased heart rate and electrodermal activity (Bradley et al., 2001). Within this framework, it is understood that as threat increases, so does fearful responding and associated attempts to protect oneself.

Under certain conditions, humans also show evidence of this pattern of defensive responses (Barlow, Chorpita, & Turovsky, 1996; Bradley et al., 2001; Bradley & Lang, 2000; Cuthbert, Bradley, & Lang, 1996; Fanselow, 1994; Lang, 1995; Lang et al., 1997). The progression that occurs during the defense cascade, as well as other animal models of sequential reactivity (e.g., Porges polyvagal theory; Porges, 1995, 1997, 2001), highlights the dynamic relationship between appraisals, emotions, and behaviors during an environmental stressor. Specifically, during each stage, new appraisals are made, which initiate different subjective feelings, physiological reactions, and action tendencies, which can then influence subsequent behavioral responding. Although there is limited research on the subject, one study that did examine the relation between the defense cascade and PTSD found some evidence supporting the idea that the full defense cascade is associated with PTSD. Specifically, individuals with PTSD showed a faster fight or flight response (i.e., evidence of the postencounter stage) to affective pictures, whereas trauma-exposed controls dis-

played an indiscriminate orienting response (i.e., evidence of the encounter stage; Adenauer, Catani, Keil, Aichinger, & Neuner, 2010). Additional research is needed to examine more fully the link between the defense cascade and PTSD.

Behaviors during event exposure are often classified as being either active or passive acts. Active physical resistance includes behaviors such as biting, cursing, and kicking (i.e., those that appear to indicate a fight response), whereas passive behavioral responses include remaining quiet and motionless and doing as told (i.e., those that appear to indicate a freeze response; Kaysen et al., 2005). Research has suggested that peritraumatic passive behavior is positively correlated with PTSD, whereas peritraumatic active behavior is negatively correlated with PTSD (e.g., Atkeson, Calhoun, & Morris, 1989; Bart & O'Brien, 1984; Punamäki, Qouta, & El-Sarraj, 2001). For example, in a study examining the reactions of female crime victims, Rizvi et al. (2008) found a four-factor model of peritraumatic responses. Two of the factors described behavioral responses; that is, one described active behavioral responses, and the other described passive behavioral responses. Responding in an active manner was negatively correlated with PTSD symptoms, whereas responding in a passive manner was positively correlated with PTSD symptoms.

One particular type of passive behavior that has shown a strong relationship with PTSD is tonic immobility (TI). It is widely recognized that TI, described as the ultimate defensive reflex in the defense cascade (e.g., Gallup, 1974; Gallup & Rager, 1996), occurs under extreme conditions in which the individual fears for his or her life and perceives no escape from the circumstances eliciting such fear. During TI, an organism involuntarily exhibits physiological reactions that are the equivalent of "playing dead"; it exhibits gross motor inhibition, suppressed vocal behavior, fixed and focused stare, and decreases in body temperature (e.g., Marx, Forsyth, Gallup, Fusé, & Lexington, 2008). Researchers have suggested that TI is an evolutionarily advantageous survival strategy, because a predator is less likely to attack an animal that is believed to be already dead. In other words, TI is a functionally adaptive set of self-preservation responses designed to help an individual survive an attack when all methods of escape have failed (Marx et al., 2008). Recent research has suggested that TI occurs in humans and is associated with PTSD (Bovin, Jager-Hyman, Gold, Marx, & Sloan, 2008; Galliano, Noble, Travis, & Puechl, 1993; Heidt, Marx, & Forsyth, 2005). However, it should be noted that researchers have assessed TI only retrospectively in humans.

In addition to differing in their degree of passiveness versus activeness, it may also be useful to distinguish behaviors on the basis of sense of personal control. For example, in a study of survivors of a terrorist attack, Shalev, Schreiber, and Galai (1993) found that the survivors reported using a wide variety of behavioral strategies (e.g., preserving a sense of human dignity by covering their bodies; actively searching for survivors in the rubble). Regardless of the type of strategy employed, the survivors who reported having successfully achieved their individual goals increased their sense of control and reduced their distress. As there is evidence linking lack of perceived control and PTSD symptoms (e.g., Frazier, 2003), examining the degree that peritraumatic behaviors engender a sense of control may be a promising area for research.

Limitations in Assessing Peritraumatic Reactions

Criterion A is unique in that unlike other criteria for the PTSD diagnosis (and, in fact, unlike the criteria of most other diagnoses listed in the *DSM*), it requires the individual to recall aspects of an event that occurred in the sometimes 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 symptoms that occurred over a period of 1 month; Blake et al., 1995), reporting on Criterion A necessarily requires reflection because, by definition of the diagnosis, the event occurred in the past. That is, according to the specifications of *DSM-IV*, the diagnosis of PTSD cannot be rendered until at least 1 month has passed since the traumatic event occurred (APA, 2000). Further, even if Criterion A is assessed prospectively, it can be identified only prior to the diagnosis of PTSD; it cannot be assessed prior to the traumatic event itself.

This reliance on retrospective reports leaves assessment of Criterion A open to a myriad of potential biases and errors (e.g., Rubin et al., 2008; Weathers & Keane, 2007). For instance, reports can be subject to forgetting and memory deficits (Candel & Merckelbach, 2004), 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), and other preexisting factors (e.g., an individual's perception of his or her own emotionality, see Barrett, 1997; gender, see Ouimette, Read, & Brown, 2005). 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).

The majority of studies that have examined how retrospective reporting affects Criterion A have primarily focused on Criterion A1. Specifically, researchers have been interested in elucidating the degree to which reporting of trauma exposure is consistent over time as well as the degree to which the presence of PTSD symptoms (i.e., Criteria B, C, and D) affects the consistency of trauma exposure reporting. The majority of studies have supported the notion that trauma-exposed individuals are generally consistent in reporting traumatic events over time (e.g., Bramsen, Dirkzwager, van Esch, & van der Ploeg, 2001; King et al., 2000; Krinsley et al., 2003; Ouimette et al., 2005; Roemer, Litz, Orsillo, Ehlich, & Friedman, 1998), with some notable exceptions (e.g., Southwick, Morgan, Nicolaou, & Charney, 1997). In contrast, research has been less conclusive in determining the degree to which PTSD symptoms influence retrospective reporting of traumatic experiences. Several studies have provided evidence that the variability of reporting is associated with specific PTSD symptoms (e.g., Southwick et al., 1997). In particular, intrusive symptoms appear to be correlated with increased reporting of traumatic events (King et al., 2000; Ouimette et al., 2005; Roemer, Litz, et al., 1998), whereas avoidance and numbing symptoms tend to be correlated with decreased reporting of traumatic events over time (King et al., 2000; Ouimette et al., 2005). However, King et al. (2000) conducted a regression-based cross-lagged analysis with a large sample of male and female Gulf War veterans. From the results, they concluded that although there was a marginal association between Time 1 PTSD symptom severity and Time 2 reported stressor exposure for men, later reports of stressor exposure were primarily accounted for by earlier stressor reports and less so by earlier

PTSD symptomatology. King et al. argued that on the basis of these results, changes in reporting of past events over time are not necessarily influenced by PTSD symptom severity. It is interesting that the results for women veterans did not show the same cross-lagged relationships between Time 1 PTSD symptoms and Time 2 stressor exposure. The authors discussed two possible reasons for this: (a) low statistical power and (b) women's increased capacity to use posttrauma social supports to sever the relationship between stressor exposure and symptomatology. In a study of Dutch peacekeepers, Bramsen et al. (2001) found no relation between the consistency of self-reported exposure to traumatic events and PTSD symptom severity. Taken as a whole, these studies suggest that self-reports of exposure to traumatic events remain relatively stable over time. Although the effect of PTSD symptoms on retrospective reporting is more equivocal, the majority of studies support the notion that these reports are not unduly influenced by PTSD symptom severity.

Although the aforementioned studies provide information about consistency of reports of trauma exposure over time, they do not speak to the consistency of reports of the peritraumatic experiences that accompany these events. Only one study to date has explicitly examined the consistency of Criterion A2 emotions over time. Ouimette et al. (2005) assessed substance use disorder patients (40% of whom qualified for a diagnosis of current PTSD) after entering inpatient substance use disorder treatment and at a 6-month follow-up. In addition to their other results, the authors examined participants' consistency in reporting Criterion A2 emotions for seven specific traumatic events (i.e., witnessed family violence, disaster, sexual abuse or assault, physical abuse or assault, robbed or mugged, sudden death of a loved one, and accident). The consistency of Criterion A2 reporting varied by event type. Specifically, whereas reports of Criterion A2 when witnessing family violence ($\kappa = .72$) and experiencing sexual abuse or assault ($\kappa = .68$) remained the most consistent over time, reports of Criterion A2 that occurred when individuals were robbed or mugged ($\kappa = .39$) and when they identified that their traumatic event was an accident ($\kappa = .29$) were the least consistent. Although these results suggested that reports of Criterion A2 emotions may vary in consistency as a function of trauma type, the authors did not report whether these differences were statistically significant. Further, as these results were based on a sample of substance use disorder patients, it is unclear whether they generalize to samples with other types of psychopathology.

One specific peritraumatic experience outside the current Criterion A2 emotions that has been assessed for its consistency over time is peritraumatic dissociation. Researchers have argued that retrospective reports of peritraumatic dissociation may be vulnerable to inconsistency due to forgetting, attributional biases, and malingering (Candel & Merckelbach, 2004). G. N. Marshall and Schell (2002) found that among survivors of community violence, subsequent memory for peritraumatic dissociation (measured at 3- and 12-month follow-ups after the trauma) was often inconsistent with reports made within days of traumatic event exposure. Zoellner, Sacks, and Foa (2007) reported similar results among assault survivors. They found that over the course of 12 weeks, reports of peritraumatic dissociation decreased.

The results presented, thus far, speak to the consistency of reporting of both traumatic events and peritraumatic experiences. However, these studies do not speak to the accuracy of these

reports. Although it is possible that consistency is a proxy for accuracy, it is also possible that consistent reporting merely indicates that individuals are consistently overreporting or underreporting their traumatic experiences. To examine the accuracy of retrospective reporting of peritraumatic experiences, researchers would need to assess the experience in the moment (i.e., during and/or in the immediate aftermath of the trauma), assess the experience retrospectively, and compare the concordance between these two data points. Although no studies to date have assessed Criterion A2 emotions in this way, there are examples of such studies in the emotion literature. Barrett (1997) assessed the accuracy of retrospective reports of emotions in a sample of undergraduate students. At the beginning of the study, participants completed a battery of personality measures. Participants then completed an affect checklist three times per day for 90 days. One day after this 90-day period, participants completed a retrospective assessment, in which they rated how much they had felt each of the emotions on the checklist over the last 3 months. Overall, Barrett found that retrospective ratings of both negative and positive emotions contained both accurate and inaccurate information. Specifically, although participants' momentary ratings of emotion were strongly related to the retrospective ratings, their personality also influenced their retrospective reports. That is, individuals who scored high on neuroticism overestimated the amount of negative emotions they experienced during the course of the study; individuals who scored low on neuroticism displayed the reverse pattern. There was also some evidence that individuals who described themselves as extroverted overestimated the amount of positive emotions they experienced during the course of the study and that the reverse was true for individuals who scored high on introversion, although these findings were not as robust as those for neuroticism. Moreover, participants' personalities influenced retrospective reports of distinct emotions differently. For instance, although respondents' descriptions of themselves on neuroticism made an independent contribution to the recall-based ratings of guilt and fear, ratings of sadness or hostility did not show this effect.

Although the Barrett (1997) study provides information about the accuracy of retrospective reports of emotion in general, it does not address the accuracy of retrospectively reported emotions that occurred during a potentially traumatic stressor. Further, it speaks only to reports of emotions; it does not consider the accuracy of reporting other peritraumatic reactions (e.g., cognitions, physiological reactions, behaviors). As such, an accurate assessment of the peritraumatic experience remains an empirical challenge.

Several clever ways to potentially examine peritraumatic experiences as they occur (i.e., during the event or in the immediate aftermath) exist in the literature. For instance, Ozer et al. (2003) argued that researchers might consider accompanying emergency personnel on their runs to collect data. In addition, researchers have suggested inducing peritraumatic dissociation in the laboratory through either pharmacological (e.g., ketamine; Ozer et al., 2003) or nonpharmacological (Zoellner et al., 2007) inductions. Other researchers have shown films that serve as a trauma analogue in the laboratory (e.g., Holmes, Brewin, & Hennessy, 2004; Holmes, James, Coode-Bate, & Deeprose, 2009). Holmes et al. (2004) conducted three studies in which participants viewed trauma analogue films to examine intrusive memory development. Over the course of these studies, the authors assessed levels of

dissociation (among other variables) while participants viewed the film and found that increases in dissociation during the viewing were associated with later intrusions. Because viewing a film clip does not qualify as a Criterion A1 stressor, these findings may not be generalizable to the relationship between peritraumatic experiences and subsequent functioning in a sample of individuals who have actually experienced a Criterion A1 stressor. However, their findings parallel those from several other studies that have examined dissociation after a Criterion A1 stressor (e.g., Bremner & Brett, 1997; Tichenor et al., 1996). This may suggest that measuring experiences that occur during the viewing of the film and comparing these with participants' retrospective ratings of their experiences during the film might provide information as to how accurate retrospective reporting is for actual trauma survivors.

It is possible that trying to assess peritraumatic experiences accurately through retrospective reports is futile. Southwick et al. (1997) touched on this idea, noting that "it may make greater psychotherapeutic sense to work with the patient's current version of the past, since the 'real' version may no longer exist" (p. 176). Rubin et al. (2008) supported this conceptualization, arguing that PTSD itself is both developed and maintained through an explicit memory of a particular event, not from the event per se. On the basis of this idea, Rubin et al. proposed the mnemonic model of PTSD. This model proposes that the diagnosis of PTSD is inherently flawed in that it requires objective information about the traumatic event and peritraumatic emotions but uses retrospective memories that are prone to bias and confounded with current goals and attitudes. As an alternative, instead of trying to remove the reconstructionist element from the "real" peritraumatic experience, the authors suggested that the PTSD diagnosis should focus on the memory of these emotions, reconstruction and all. From this perspective, the accuracy of retrospective reports of the peritraumatic experience is irrelevant; rather, the responses that individuals remember experiencing and how these responses serve to maintain PTSD symptoms should be the focus of Criterion A2. This proposal also has utility in avoiding another pitfall of self-report, namely, that individuals often experience a much larger number of responses than those that they can report (e.g., Scherer, 2009).

Summary and Recommendations

Our review of the literature suggests that in service to the mission of the *DSM*, Criterion A2 should be expanded to reflect the fact that organisms respond in a complex and coordinated manner to an environmental stressor. In humans, when the environmental stressor is appraised as significant to well-being and taxing or exceeding the resources of the individual, this entire set of reactions comprises the traumatic stress response. As such, our model suggests that the initial response to an environmental stressor is an appraisal, which organizes an intense emotional experience. The emotional experience involves an integration of subjective emotions, additional cognitions, and physiological responses. Various types of specific appraisals during an environmental stressor are possible because different aspects of well-being can be threatened. Thus, an individual may generate a number of emotional reactions during the experience. In turn, the nature of the emotional experience then influences subsequent peritraumatic behaviors that may be either passive or active. We have argued that

by conceptualizing the peritraumatic experience as a rich integration of appraisals, action tendencies, and physiological changes, we provide a more complete model for understanding the traumatic stress response.

An implication of this model is that Criterion A2 may do more than simply describe one's peritraumatic experiences and reactions; it may be integral in defining what constitutes a traumatic stressor. In other words, we assert that a traumatic stressor is defined as a function of the interaction between the individual and his or her environment. In order for an event or stressor to be defined as traumatic, the individual's immediate response must be taken into consideration. As such, it is not possible to disentangle the eliciting conditions from the responses of the individual that they occasion. Appraisals of the ability (or inability) to cope, intense emotions and feelings of being overwhelmed, and other responses that occur are equally as important as the objective characteristics of the stressor (e.g., who, what, when, where, frequency, duration, intensity) in defining the event for the individual.

Solely relying on the objective characteristics of the event to define it as traumatic is problematic because it ignores the fact that different individuals frequently perceive and respond to the same event characteristics quite differently. Similarly, solely relying on an individual's response to define traumatic stress is problematic because it ignores the fact that the response is not happening in a contextual vacuum and that environmental events can be important determinants of outcome. Using the individual's postevent reactions (e.g., subsequent development of PTSD symptoms) to determine what constitutes a traumatic stressor is similarly flawed because it does not acknowledge the fact that most individuals do not develop PTSD following exposure. In fact, individuals may follow multiple postevent trajectories (Bonanno, 2004) that may be influenced by a number of factors (e.g., prior trauma history, prior psychological adjustment, posttrauma social support; Ozer et al., 2003). As such, whether the individual develops PTSD or another *DSM*-related disorder is not indicative of whether the individual experienced a traumatic stressor.

Our assertion that peritraumatic emotional responses may be broader than fear and other fear-related emotions (i.e., helplessness, horror) has implications for whether PTSD should be considered an anxiety disorder. Since *DSM-III*, PTSD has been categorized in this manner. More recent factor-analytic studies, however, have shown that PTSD is actually more closely related to disorders with anhedonia, worry, and rumination as their main features (e.g., major depressive disorder, generalized anxiety disorder) than disorders typified by fear and avoidance (e.g., simple phobias, social anxiety disorder, panic disorder, obsessive-compulsive disorder; Miller, Resick, & Keane, 2009). Recently, Miller et al. (2009) called for the creation of a new class of disorders, the traumatic spectrum disorders. Miller et al. suggested that this new class would include disorders, such as PTSD, that result from the interaction between an environmental stressor and individual vulnerabilities. Our position that PTSD may be preceded by a much broader class of emotions during the potentially traumatic event supports the conceptualization of PTSD as a heterogeneous disorder that defies the current diagnostic classification scheme. Our assertion about the broad nature of the peritraumatic response also has implications for etiological theories of PTSD. Specifically, theoretical models that do not account for the appraisals, action tendencies, physiological reactions, and behav-

iors during the event exposure may not provide a complete account of the etiology of PTSD.

Prior research has shown that individuals with PTSD may experience alexithymia, the inability to verbalize their emotions (e.g., Frewen, Dozois, Neufeld, & Lanius, 2008). Therefore, individuals who are alexithymic may have difficulty providing such information and may be at risk for being underdiagnosed with PTSD by current *DSM-IV* diagnostic criteria. Expanding Criterion A2 to include appraisals, a broader group of emotions, additional cognitions, physiological responses, and behaviors would circumvent such difficulties and potentially allow alexithymic individuals, as well as others who are unable to report their subjective emotions for different reasons (e.g., they were emotionally numb during the event), to be eligible to receive a PTSD diagnosis.

More research is necessary to determine how changing the definition of traumatic stress in the ways discussed here will affect prevalence rates of exposure to traumatic stress as well as PTSD. Although changing the definition of a traumatic stressor to incorporate a broad spectrum of individuals' responses may allow more individuals to pass through the "exposed-to-traumatic-stress gate," that does not necessarily mean that more individuals will be diagnosed with PTSD, as demonstrated by the *DSM-IV* field trial. One possibility for the *DSM* to consider would be to specify that an individual must exhibit a certain pattern or configuration of peritraumatic responses in order to fulfill Criterion A. This specification could limit the number of individuals who are eligible to receive a PTSD diagnosis, while still remaining consistent with the empirical findings regarding traumatic stress.

There are other questions still left to answer. Specifically, although we have advocated for broadening the types of responses that are included in Criterion A2 based on prior empirical findings, more research is needed to better determine exactly which additional peritraumatic responses, or combination of responses, should be included in this diagnostic criterion. In addition, it is still unclear which individual and trauma-specific factors, as well as their interaction, will improve the utility of the peritraumatic experience for clinicians and researchers. Nevertheless, by changing the definition of what constitutes a traumatic stressor, the field will encourage more research that will perhaps move clinicians and researchers closer to understanding the best way to conceptualize and assess the peritraumatic experience, as well as the types of peritraumatic experiences that are most related to PTSD.

It is also possible that future research may determine that particular peritraumatic responses are predictive of specific PTSD symptoms or symptom profiles. For example, drawing on the work of Miller and his colleagues (e.g., Miller, Greif, & Smith, 2003; Miller, Kaloupek, Dillon, & Keane, 2004; Miller & Resick, 2007), future studies may demonstrate that peritraumatic anger forecasts the subsequent development of a PTSD externalizing subtype, in which PTSD is associated with higher levels of disinhibition, comorbid substance dependence, and features of borderline, antisocial, narcissistic, and histrionic personality disorder reactions. Likewise, peritraumatic sadness may predict the subsequent development of a PTSD internalizing subtype, in which PTSD is associated with comorbid mood disorders. However, more research is needed to examine this possibility.

McNally (2009) previously stated that clinicians and researchers "should eliminate Criterion A2 [from the *DSM*]. In the language of behaviorism, it confounds the response with the stimulus. In the

language of medicine, it confounds the host with the pathogen" (p. 598). We believe this analysis is incorrect. In terms of the stimulus-response analogy, McNally's comment is at odds with a well-accepted assumption among many behaviorists that an individual's responses can, and often do, serve as stimuli for subsequent responses. For example, cognitive-behaviorists assume that cognitions (an unobservable response) can influence more overt behaviors (Dobson & Dozois, 2001). It is also inconsistent with the fact that the PTSD diagnosis itself already recognizes that an individual's cognitive and/or affective responses can serve as stimuli for subsequent behaviors. Specifically, *DSM-IV* PTSD Symptom C1 states that the individual avoids thoughts and feelings associated with the trauma, and Symptoms B4 and B5 state that the individual becomes distressed and physiologically aroused when confronted by reminders (e.g., intrusive thoughts) of the traumatic event, respectively. As such, both criteria recognize that an individual's response (i.e., thoughts and feelings about the traumatic event) can serve as a stimulus to trigger other responses (e.g., avoidance). In terms of the host-pathogen analogy, our analysis does not suggest that the person him- or herself (i.e., the host) is the pathogen. Rather, it is the person's peritraumatic response that may be pathogenic, but perhaps only if it is still exhibited by the individual long after the environmental stressor has terminated (i.e., posttraumatically). Thus, once adaptive responses for handling an environmental stressor are now maladaptive. It is these maladaptive responses (i.e., PTSD symptoms) that are treated by all evidence-based psychosocial treatments for PTSD (e.g., Astin & Resick, 1998; Cahill, Rothbaum, Resick, & Follette, 2009; Foa, Hembree, & Rothbaum, 2007; Riggs & Foa, 2009).

In closing, our review suggests that the peritraumatic experience consists of a rich collection of responses that is much broader than the responses currently included in Criterion A2. Our review also suggests that these responses may interact with and influence one another as well as the nature of the objective event. Further, many of these responses are associated with the subsequent development of PTSD. These empirically supported findings suggest that an accurate depiction of traumatic stress includes both an event and the individual's responses to it. Although research has suggested that the interaction between the individual and the precipitating event is critical in defining the exact nature of that event, current PTSD diagnostic procedures and practices do not adequately reflect this.

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