Predictors of Peritraumatic Reactions and PTSD Following the September 11th Terrorist Attacks

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In this study the authors characterize peritraumatic reactions of residents of New York City during and immediately following the September 11th terrorist attacks, identify predictors of those reactions, and identify predictors of PTSD 4 months later. A cross–sectional sample of New York residents (n = 2,001) responded to questions about sociodemographics, historical factors, event–related exposure; acute cognitive, emotional, and physiological reactions to the September 11th terrorist attacks; and current (past month) PTSD symptoms. Factor analyses of peritraumatic reactions yielded three related, but distinct, peritraumatic response patterns—dissociation, emotional reactions, and panic/physiological arousal. Several demographic, historical, and exposure–related variables predicted one or more peritraumatic reaction patterns. After controlling for demographic, historical, and exposure factors, each of the peritraumatic reactions factors, one historical factor and one event–related exposure factor remained as significant predictors of PTSD. These results support a growing literature concerning the predictive value of peritraumatic reactions in relation to PTSD. Implications for preventive efforts and suggestions for future research are discussed.

The September 11, 2001, terrorist attacks on the World Trade Center (WTC) in New York City were unprecedented in their scope. The mental health effects of the WTC attacks on U.S. citizens at large are relatively well documented (e.g., Schuster, Stein, & Jaycox, 2001), though some researchers have reported on those more directly affected by the attacks. For example, Schlenger et al. (2002) reported that 11.2% of New York City residents met criteria for PTSD 1 to 2 months after the attacks, which was signifi-

cantly higher than levels found in the rest of the country. Galea, Ahern, et al. (2002) reported that 7.5% of a random sample of Manhattan residents met criteria for PTSD approximately 1 month after the attacks. Both reports indicate a prevalence of PTSD significantly higher than that expected in the absence of the terrorist attacks (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

Although exposure to a potential stressor increases overall risk of PTSD, many people who experience a potentially traumatic event fail to develop such mental health problems (Blanchard et al., 1996; Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). Indeed, a substantive empirical literature outlines various demographic and event–related factors associated with the subsequent development of PTSD symptoms among individuals exposed to such events (Brewin, Andrews, & Valentine, 2000; Emery, Emer, Shama, Quiana, & Jassani, 1991; Ozer, Weiss, Best, & Lipsey, 2003). Increasingly, researchers are focusing on how an individual's responses to traumatic events may be related to later PTSD symptoms. Specifically, researchers have reported associations between an individual's acute cognitive, physiological, and emotional reactions during such an event (i.e., *peritraumatic* reactions) and later PTSD symptoms.

Several studies have evaluated the role of acute dissociative symptoms in predicting PTSD symptoms. Dissociation refers to alterations in cognitive functioning and perceptual changes, characterized by derealization, numbing/detachment, reduced awareness of surroundings, or depersonalization (Marmar et al., 1994). Dissociation has been proposed to be adaptive in the short–term by theoretically minimizing the emotional impact of the traumatic event by reducing or altering awareness of the experience (Van der Kolk, Brown, & Van der Hart, 1989), but such responses have also been found to be associated with the development of PTSD symptoms. Relationships between peritraumatic dissociation and PTSD have been observed among Vietnam veterans (Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996), emergency service personnel (Weiss, Marmar, Metzler, & Ronfeldt, 1995), college students (Bernat, Ronfeldt, Calhoun, & Arias, 1998), motor vehicle accident survivors (Ehlers, Mayou, & Bryant, 1998), and survivors of natural disasters (Koopman, Catherine, & David, 1994). The relationship between dissociation and PTSD after the September 11th attacks is less clear. Grieger, Fullerton, and Ursano (2003) reported higher levels of peritraumatic dissociation among survivors of the September 11th attack on the Pentagon with PTSD; however, Simeon, Greenberg, Knutelska, Schmeidler, and Hollander (2003) reported that dissociation did not predict PTSD status after controlling for degree of exposure (e.g., proximity to towers, injury, witnessed jet crash) in Manhattan. Different conclusions may have been drawn, and the generalizability of these findings may be limited, because both studies used quite small and self–selected samples.

Individuals who experience intense peritraumatic emotional reactions of fear, helplessness, or horror are also at risk for PTSD. Bernat et al. (1998) reported that scores on a self–report measure of such responses during or shortly following exposure to a traumatic event were significantly associated with scores on a self–report measure of PTSD in college students. Similarly, Brewin, Andrews, and Rose (2000) reported that crime victims who reported intense feelings of fear, helplessness, or horror during or shortly after the event were more likely to meet criteria for PTSD 6 months later. Simeon et al. (2003) also found that scores on a measure of emotional distress during the September 11th terrorist attacks were significantly associated with PTSD symptoms.

Individuals who experience strong physiological reactions during a traumatic event may also be at increased risk for PTSD symptoms. For example, Bryant and colleagues have reported that motor vehicle accident survivors who developed PTSD 6 months (Bryant, Harvey, Guthrie, & Moulds, 2000) and 2 years (Bryant, Harvey, Guthrie, & Moulds, 2003) later had significantly higher heart rates immediately after the accident

than did those who did not develop PTSD; yet Blanchard, Hickling, Galovski, and Veazey (2002) failed to find a relationship between peritraumatic cardiac reactivity and PTSD in a sample of motor vehicle accident survivors approximately 1 year after their accident, perhaps because their patients were self–selected treatment seekers, while other studies used consecutively identified cases (Bryant et al., 2000; Bryant et al, 2003; Shalev et al., 1998). Similar findings are reported in studies of exposure to terrorism incidents. Galea et al. reported that September 11th terrorist attack survivors who reported experiencing a panic attack at the time of the event were significantly more likely to report PTSD symptoms 1 (Galea, Ahern, et al., 2002) and 6 (Galea, Vlahov, et al., 2003) months later than those who did not experience a panic attack, echoing similar findings among survivors of the Oklahoma City bombing (Tucker, Pfefferbaum, Nixon, & Dickson, 2000).

The extant literature concerning peritraumatic responses suggests that individuals who experience (a) dissociation, (b) intense emotional reactions, and/or (c) panic/arousal are at increased risk for developing PTSD symptoms. However, the relative associations of these intercorrelated (Bernat et al., 1998) peritraumatic response phenomena with PTSD are ambiguous to date because most researchers have examined each phenomenon in relative isolation from the others, making it difficult to establish the relative importance of each response in relation to PTSD. Moreover, most research reported to date has used convenience samples (e.g., emergency room patients) of people with various traumatic event experiences (e.g., motor vehicle accidents, interpersonal violence). A clearer understanding of the traumatic event–related factors that impact psychological functioning can be gleaned by drawing associations between acute traumatic event–related reactions and PTSD symptoms in a representative sample of individuals exposed to a single event.

The purpose of our research was to evaluate associations among sociodemographics, historical factors, event–related ex-

posure, peritraumatic reactions, and PTSD 4 months after the September 11th terrorist attacks within a population of New York City residents. We began by characterizing the peritraumatic reactions to the WTC attacks and establishing demographic, historical, and exposure–related predictors of these reactions. We then evaluated the unique associations among the various retrospectively reported peritraumatic reactions and current PTSD symptoms assessed 4 months post–event. Data regarding specific acute reactions as risk factors for PTSD following traumatic events may be useful for preventive educational efforts that may target responses in the acute post–event time frame.

METHOD

Participants

Participants were recruited from a random digit dial survey of New York City residents conducted between January 15 and February 21, 2002. The interview sample included adult residents (18 years or older) of New York City with an oversampling of Manhattan residents living south of 110th Street, the area in New York City closest to the World Trade Center. The response rate among eligible participants in this sample was 63.5%. (See Galea, Boscarino, Resnick, & Vlahov [2002] and Galea, Vlahov, et al. [2003] for more detail regarding sampling and this particular sample.) All participants provided verbal consent for their participation over the phone. The Institutional Review Board of the New York Academy of Medicine reviewed and approved this study.

Procedure

Trained interviewers used a computer–assisted telephone interview system (available in English and Spanish) to query participants. The survey lasted approximately 35 minutes. They responded to questions about demographics, their proximity to the World Trade Center during the September

TABLE 1. Comparison of Sample Characteristics of New York City Residents Sampled Four Months After the September 11th World Trade Center Attacks with those Among Residents during the 2000 US Census

	Sample Percent	2000 U.S. Census Percent	χ^2	p Value
Age				
18–24	15.2	13.2	2.97	0.70
25–34	25.6	22.5		
35–44	22.2	20.8		
45–54	16.9	16.7		
55–64	10.2	11.3		
65 +	9.8	15.5		
Gender				
Male	46.5	46.2	0.0036	0.95
Female	53.5	53.8		
Race				
White	40.5	38.7	2.6	0.63
African American	25.7	23.0		
Asian	5.4	10.1		
Hispanic	25.0	24.7		
Other	3.3	3.6		

11th terrorist attacks, their experience at the time of the attacks, and their exposure to media accounts of the attacks afterward. Participants also responded to questions about stressful events (e.g., prior traumatic experiences, divorce, death of a family member) in their lifetimes and in the 12 months prior to September 11, 2001.

We measured participants' retrospective accounts of their emotional responses during or soon after the attacks using a series of 16 *yes*/*no* questions adapted from the Diagnostic Interview Schedule describing symptoms of a panic attack (Robins, Helzer, Croughan, & Ratcliff, 1981) and from the Initial Reactions Scale (Kilpatrick et al., 1998). Participants responded to questions regarding cognitive (e.g., detached as if in a dream), emotional (e.g., helplessness), and physiological reactions (e.g., dizziness) during or soon after the terrorist attacks. We used the National Women's Study PTSD module to measure PTSD symptoms. This module assesses the presence of criteria B, C, and D symptoms and determines the content of content–specific PTSD symptoms (e.g., content of intrusive thoughts, specific avoidance cues). PTSD Criterion A was not assessed because we were interested in PTSD symptoms among a representative sample of individuals who may or may not have witnessed the terror attacks. The National Women's Study PTSD module is a valid assessment tool (Kilpatrick et al., 1998) when compared in a field trial with the clinician–administered Structured Clinical Interview for *DSM–III–R* (Spitzer, Williams, Gibbon, & First, 1992). For the purposes of this research, we assessed PTSD symptoms for the 30 days prior to the interview. For symptoms that involved specific content (e.g., memories or thoughts), we asked about content; these symptoms had to be related to the September 11 attacks to qualify as symptoms of current PTSD.

Statistical Analyses

All statistical analyses were conducted using SAS and SUDAAN. We conducted a factor analysis to identify distinct groupings of the 16 items measuring acute psychological reactions after September 11. Factors with eigenvalues greater than the average eigenvalue of 0.34 were retained. This decision was supported by a bend in the Scree plot after the third factor. We used an orthogonal factor rotation followed by an oblique rotation due to high correlations among the factors (the promax rotation in SAS). Variables with a factor loading of 0.32

TABLE 2. Factor Analysis (and Associated Factor Loadings) of Acute Emotional Responses After the September 11th World Trade Center Attacks

22.52% of the Variance	Factor I: Panic/Physiological Arousal
Fearful of going crazy/losing control	.40
Shortness of breath	.61
Dizziness	.62
Rapid heart beat	.56
Trembling or shaking	.60
Sweating	.59
Hot flushes or chills	.58
Nausea or abdominal distress	.51
Body numbness or tingling sensations	.50
Choking	.51
Chest pain or discomfort	.62
8.85% of the variance	**Factor II: Emotional Reactions**
Fear of dying	.44
Helplessness	.65
Horror	.61
6.21% of the variance	**Factor III: Dissociation**
Felt like it wasn't really happening	.56
Detached as if in a dream	.59

or greater (Tabachnick & Fidell, 1996, p. 677), which reflects at least 10% overlapping variance, were considered part of a specific factor. The items in each factor were used to create peritraumatic reaction subscales by summing responses to the items and dividing by the number of items. Once these subscales were established, we used bivariate linear regression models to examine associations between sociodemographic, historical, and event–related factors and participants' acute emotional responses during the WTC attacks. We used bivariate logistic regression models to examine relations of sociodemographic, historical, event–related, and acute emotional reactions with current PTSD status. We used multivariable linear regression analysis to assess the adjusted relations between predictors of each acute emotional reaction subscale. Finally, we used a multivariable logistic regression to assess adjusted relations between predictors of PTSD status. Predictors were entered sequentially in the following groups: demographic characteristics, prior supports and stressors, September 11th exposure factors, and acute emotional reaction subscales. Significance level of $p = 0.05$ was chosen a priori for all significance testing.

RESULTS

Sample Characteristics

A total of 2,001 adults were surveyed. Table 1 provides a comparison of the demographic characteristics of this sample with those provided by the 2000 Census (Bureau of the Census, 2000). The samples are similar in terms of gender, ethnicity, and marital status, suggesting that the sample surveyed adequately represents the larger population.

Characterization of Acute Responses

As described in the methods, we conducted a factor analysis to identify subscales of participants' acute emotional responses during the WTC attacks. The analysis revealed three distinct factors (see Table 2). The first factor (panic/physiological arousal) had 11 items and accounted for 22.52% of the variance. The second factor (emotional reactions) had three items and accounted for 8.85% of the variance. The third factor (dissociation) had two items and accounted for 6.21% of the variance. The proportions of variance accounted for by these factors should be used as rough indicators, as overlapping

variability among the factors necessitated an orthogonal factor rotation followed by an oblique factor rotation, and variance explained can only be calculated after the orthogonal rotation step. The correlations among the three peritraumatic reaction subscales, which ranged from 0.29 to 0.43, were all significant ($p < 0.001$).

Predictors of Emotional Reactions

To evaluate predictors of acute reactions during the attacks, we used bivariate linear regression models to assess associations between sociodemographic, historical, and exposure–related factors and the three reactions subscales. Once significant associations were identified among the relevant predictors ($p < 0.05$), we included variables that were significant in bivariate models in a multivariate linear regression model for each reaction scale outcome. Unique associations for each of the three reactions subscales are described below.[1]

Dissociation. Bivariate analyses indicated that reports of dissociative symptoms were significantly associated with age, gender, race, seeing the WTC attacks in person, fear of injury/death, lost possessions, lost job, and being below Canal Street during the attacks (all ps $\leq$ 0.04). Multivariate analysis predictors for dissociative responses during the September 11th attacks were age (at least 55 years old), female gender, African American or Hispanic race, and fear of death or injury (all ps $\leq$ 0.02).

Emotional Reactions. Bivariate analyses indicated that reports of emotional reactions were significantly associated with age, gender, race, income, education, marital status, lifetime stressors, 12–month stressors, seeing WTC attacks in person, fear of injury or death, losing possessions, media exposure, being below Canal Street, and living below 14th Street (all ps $\leq$ 0.02). Multivariate analyses indicated that experiencing emotional re-

actions was significantly associated with age (25–34 and 45–54), female gender, African American or Asian race, being divorced or never married, two or more lifetime stressors, one or more stressors in last 12 months, fear of death or injury, high media exposure, and being below Canal Street during the attacks (all ps < 0.05).

Panic/Physiological Arousal. Bivariate analyses indicated that reports of panic/physiological arousal symptoms were significantly associated with age, gender, race, social support, past 12–month stressors, friend/relative killed, lost possessions, being involved in the rescue effort, media exposure, and being below Canal Street during the WTC attacks (all ps $\leq$ 0.03). Follow–up multivariate analyses indicated that experiencing panic/physiological arousal during the September 11th attacks was associated with female gender, African American or Hispanic ethnicity, lifetime stressors, fear of death or injury, friend or relative killed, and high media exposure (all ps $\leq$ 0.01).

Predictors of PTSD

Bivariate. To assess the relations of sociodemographic, historical, exposure–related factors and peritraumatic reaction subscales with PTSD 4 months after the September 11th attacks, we used bivariate logistic regression models. Of the entire sample, 1.7% met criteria for PTSD within the month prior to the interview, PTSD status was associated with the demographic factors of age ($p = 0.00$) and marital status ($p = 0.04$). Historical factors associated with PTSD were social support, lifetime stressors and stressors in the 12 months before the September 11th attacks (all ps $\leq$ 0.01). Exposure–related factors associated with PTSD were seeing the WTC attacks in person, fear of injury/death, friend or relative killed, being involved in the rescue effort, losing a job, media exposure, and being below Canal Street during the attacks (all ps $\leq$ 0.00).

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1. In the interest of space, only significant multivariate predictors are presented here, However, bivariate results for predictors of emotional reactions and predictors of PTSD can be obtained by contacting the authors.

TABLE 3. Significant Final–Model Multivariate Predictors of PTSD Four Months After the September 11th World Trade Center Attacks

Predictor Variable	OR	p Value	CI
Life Stressors 12 mo. before WTCD[a]			
0	ref	< .001	
1	2.58		1.37–4.87
2+	5.19		2.71–9.93
Involved in Rescue Effort[b*]	2.06	.033	1.06–3.99
Panic/Physiological Arousal[c]	1.48	.002	1.15–1.91
Dissociation[c]	2.41	< .001	1.50–3.87
Emotional Reactions[c]	1.68	.002	1.21–2.33

Note. $n = 2$[comma here]001. OR = odds ratio; CI = confidence interval; ref = reference group for risk status comparisons; [*]Yes/no question (risk status is indicated for individuals answering "yes" compared those answering "no"). [a]Historical factor; [b]Event–related exposure factor; [c]Peritraumatic reactions factor.

PTSD status was associated with each of the three acute reactions subscales (all $ps < 0.00$).

Multivariate. We used a multivariable logistic regression to assess adjusted relations between predictors of PTSD status 4 months after the September 11th attacks (see Table 3). In the final model, each of the three acute reactions factors remained as significant predictors of PTSD (all $ps = 0.00$), as did number of life stressors in the 12 months preceding the WTC attacks ($p = 0.00$) and being involved in rescue efforts soon after the attacks ($p = 0.03$).[2]

DISCUSSION

One of the strengths of the current study is the simultaneous focus on several types of peritraumatic reactions. Consistent with previous research (Bernat et al., 1998; Kilpatrick et al., 1998), our findings indicate that peritraumatic responses comprise a complex pattern of related but meaningfully distinct dissociative, emotional, and panic/physi-

ological reaction patterns. Interestingly, one factor (the emotional reactions factor) corresponded directly with Criterion A2 for posttraumatic stress disorder (Brunet et al., 2001). The distinctions among peritraumatic responses reported here suggest that each response pattern may provide important predictive information in relation to PTSD. Therefore, early attention to one or more of these factors may help identify individuals who are most in need of psychological assistance following potentially traumatic events.

Our findings are consistent with some other studies which reported that women and some ethnic groups are comparatively more prone to peritraumatic dissociation (Bryant & Harvey, 2003), emotional reactions (Brunet et al., 2001), and panic (Schmidt & Koselka, 2000) than are males and Caucasians. Risk for peritraumatic panic among women and some ethnic groups may be associated with a cognitively–based sensitivity (Reiss & McNally, 1985) to the social, psychological, and physical consequences of panic (Stewart, Taylor, & Baker, 1997) or due to

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2. The relatively large number of significant (bivariate) exposure predictors of each of the acute reactions factors and PTSD that dropped out in the multivariate analysis is likely due to significant intercorrelations among exposure factors. χ^2 analyses of these factors revealed that nearly every exposure variable that was a significant bivariate predictor of the acute reactions factors and of PTSD was significantly associated with three to five of the other predictors (except for losing a job, which was associated with only one other predictor). For example, seeing the WTC attacks in person was significantly associated (all $ps \leq 0.05$) with each of the other exposure risk factors, except for losing a job. Similarly, being involved in the rescue effort was significantly associated (all $ps \leq 0.01$) with the other exposure risk factors except for losing a job and fear of injury/death.

ethnographic differences in individual interpretations of panic–related sensations (Hinton, Nathan, Bird, & Park, 2002). Similarly, Marshall and Orlando (2002) reported that acculturation to Caucasian culture was negatively related to peritraumatic dissociation among Latino community violence victims. Future research might find fruitful the examination of potential ethnic differences in proneness to have certain reactions to stress, especially via laboratory preparations (e.g., CO_2 inhalation as a panic probe) that do not rely heavily on self–reports, which may be vulnerable to recall bias or demand effects (Zvolensky, Lejuez, Stuart, & Curtin, 2002). Our finding that older individuals (> 55 years old) are at risk for peritraumatic dissociation is inconsistent with other studies (Fullerton et al., 2000; Ursano et al., 1999) reporting no age–related dissociative responses among motor vehicle accident survivors, perhaps due to differences in the assessment of dissociation.

Several exposure–related factors (i.e., fear of death/injury, friend/relative killed, being below Canal Street, high media exposure) were associated with one or more peritraumatic response patterns during the September 11th terrorist attacks even after controlling for demographic and prior stressor exposure variables. Intense peritraumatic reactions may be understandable and functional under such circumstances; however, our results may be interpreted to emphasize important roles for critical event exposure variables as well as cultural, gender–related, and psychosocial factors in understanding peritraumatic reactions.

The relatively low prevalence of PTSD (1.7%) in New York City residents 4 months after the World Trade Center attacks is much lower than that reported among other disaster samples. This is likely due to the broad focus on directly and indirectly affected New York City residents. By contrast with the findings reported here, Galea et al. (2003) reported that 36.7% of individuals who were inside the WTC during the attack still met criteria for PTSD 6 months later. This is relatively close to the 34.3% prevalence of PTSD among individuals inside the Murrah Federal Building when it was targeted during the Oklahoma City bombing (North et al., 1999). Therefore, the seemingly low prevalence of PTSD 4 months after the WTC attacks indicated here likely reflects a pattern of relatively rapid symptom resolution among many (but certainly not all) exposed to traumatic events described in other traumatic event exposed samples (e.g., Shalev et al., 1998; Rothbaum et al., 1992).

Still, the reported significant relationships between peritraumatic reactions and PTSD suggest strongly that an individual's immediate reactions to a traumatic event may provide important information regarding risk for PTSD. Although our bivariate associations and step–level logistic regression analyses support research literature that consistently identifies strong statistical connections between exposure (e.g., severity of traumatic event), demographic (e.g., gender), and historical (e.g., prior traumatic events, social support) variables and PTSD, most of these factors did not predict PTSD in the final model. Once peritraumatic reactions were considered, only one historical factor (life stressors 12 months prior to the attacks) and one exposure variable (being involved in the rescue effort) remained as unique predictors of PTSD. Therefore, an empirical understanding of the factors most closely associated with the development of PTSD would be well–served by heightening focus on acute reactions to traumatic events in addition to clinically relevant demographic, historical, and exposure–related predictors. This perspective is consistent with those taken by authors of recent literature reviews of predictors of PTSD (Brewin, Andrews, & Valentine, 2000; Ozer et al., 2003). Of course, this does not minimize the importance of other predictive factors, such as event–related exposure variables (which are clearly related to peritraumatic reactions as described above), personality factors (Cox, MacPherson, Enns, & McWilliams, 2004), and the potential influence of biological predisposition to some peritraumatic reactions and/or to develop PTSD following a traumatic event (Barlow,

2002). Moreover, features of the post–event environment, such as adequate coping skills and social support, may mediate the relationship between a traumatic experience and the development of PTSD (King, King, Foy, Keane, & Fairbank, 1999).

The results of this study provide important information about predictors of peritraumatic reactions and the relationship between peritraumatic responses and PTSD, but future research should help clarify some questions raised here. First, the conditions under which one experiences symptoms of dissociation versus emotional reactions versus panic or any combination of the three responses is not clear. The patterns of peritraumatic responding assessed here may underlie one or more common factors (e.g., adrenergic arousal), but establishing predictors of certain peritraumatic reactions would provide potentially valuable predictive information. Second, an improved understanding of the relationships of different peritraumatic responses with later PTSD requires thorough assessment of associated response constructs. In this study, panic/physiological arousal was assessed relatively comprehensively (11 items), but only few items indexed dissociation (2 items) and emotional reactions (3 items). Researchers should use psychometrically sound and more in–depth measures of dissociation (Marmar et al., 1994), emotional reactions (Brewin, Andrews, & Rose, 2000), and panic/physiological arousal (Bracha et al., 2004) in future efforts to verify and expand upon the findings reported here. It is worth noting that, while the 4–month temporal spacing between the peritraumatic experience and retrospective recall of that experience is relatively small compared to some other studies (Tichenor et al., 1996), these data are inherently vulnerable to recall bias. Moreover, our findings should be replicated in other samples exposed to different types of traumatic events to ensure generalizability.

Similar findings in other traumatic event exposed samples would have important implications for focusing on acute reactions to a traumatic event when considering early intervention efforts to prevent the onset of PTSD. Falsetti and Resnick (1997) suggest that acute panic reactions may become conditioned responses associated with traumatic event–related cues that persist over time. Theoretically, the same could be true for traumatic event–related dissociative and emotional reactions. As such, potential public health intervention strategies might include psychoeducation about the nature of panic and other peritraumatic responses and awareness of the potential for such reactions to occur in association with later reminders of an event. Such a strategy might be one approach designed to prevent later development of secondary anxiety about the reactions themselves, and might provide greater sense of predictability and control in understanding associations between such responses and reminders of a traumatic event (Resnick, Acierno, Kilpatrick, & Holmes, 2005), the time–limited nature of such reactions, as well as awareness that such responses are not in themselves dangerous (Barlow & Craske, 1994).

REFERENCES

Barlow, D. H. (2002). *Anxiety and its disorders* (2nd ed.). New York: Guilford.

Barlow, D. H., & Craske, M.G. (1994). *Mastery of your anxiety and panic: II. Client workbook.* San Antonio, TX: Psychological Corporation.

▶ Bernat, J. A., Ronfeldt, H. M., Calhoun, K. S., & Arias, I. (1998). Prevalence of traumatic events and peritraumatic predictors of posttraumatic stress symptoms in a nonclinical sample of college students. *Journal of Traumatic Stress, 11,* 645–664.

▶ Blanchard, E. B., Hickling, E. J., Galovski, T., & Veazey, C. (2002). Emergency room vital signs and PTSD in a treatment seeking sample of motor vehicle accident survivors. *Journal of Traumatic Stress, 15*, 199–204.

Blanchard, E. B., Hickling, E. J., Taylor, A. E., Loos, W. R., Forneris C. A., & Jaccard, J. (1996). Who develops PTSD from motor vehicle accidents? *Behaviour Research and Therapy, 34,* 1–10.

Bracha, H. S., Williams, A. E., Haynes, S. N., Kubany, E. S., Ralston, T. C., & Yamashita, J. M. (2004). The STRS (Shortness of Breath, Tremulousness, Racing heart, and Sweating): A brief checklist for acute distress with panic–like sympathetic indicators; development and factor structure. *Annals of General Hospital Psychiatry, 3,* 1–23.

Brewin, C. R., Andrews, B., & Rose, S. (2000). Fear, helplessness, and horror in posttraumatic stress disorder: Investigating DSM–IV criterion A2 in victims of violent crime. *Journal of Traumatic Stress, 13,* 499–509.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta–analysis of risk factors for posttraumatic stress disorder in trauma–exposed adults. *Journal of Consulting and Clinical Psychology, 68,* 748–766.

Brunet, A., Weiss, D. S., Metzler, T. J., Best, S. R., Neylan, T. C., Rogers, C., et al. (2001). The Peritraumatic Distress Inventory: A proposed measure of PTSD criterion A2. *American Journal of Psychiatry*, *158*, 1480–1485.

Bryant, R. A., & Harvey, A. G. (2003). Gender differences in the relationship between acute stress disorder and posttraumatic stress disorder following motor vehicle accidents. *Australian and New Zealand Journal of Psychiatry, 37,* 226–229.

Bryant, R. A., Harvey, A. G., Guthrie, R. M., & Moulds, M. L. (2000). A prospective study of psychophysiological arousal, acute stress disorder, and posttraumatic stress disorder. *Journal of Abnormal Psychology, 190,* 341–344.

Bryant, R. A., Harvey, A. G., Guthrie, R. M., & Moulds, M. L. (2003). Acute psychophysiological arousal and posttraumatic stress disorder: A two–year prosective study. *Journal of Traumatic Stress, 16,* 439–443.

Bureau of the Census. (2000). Census summary tape, file 3A (STF3A) [Data file]. Washington, DC: Department of Commerce.

Cox, B. J., MacPherson, P.S.R., Enns, M. W., & McWilliams, L. A. (2004). Neuroticism and self–criticism associated with posttraumatic stress disorder in a nationally representative sample. *Behaviour Research and Therapy, 42,* 105–114.

Ehlers, A., Mayou, R. A., & Bryant, B. (1998). Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. *Journal of Abnormal Psychology, 107,* 508–519.

Emery, V. O., Emer, P. E., Shama, D. K., Quiana, N. A., & Jassani, A. K. (1991). Predisposing variables in PTSD patients. *Journal of Traumatic Stress, 4,* 325–343.

Falsetti, S. A., & Resnick, H. S. (1997). Frequency and severity of panic attack symptoms in a treatment seeking sample of trauma victims. *Journal of Traumatic Stress, 10,* 683–689.

Fullerton, C. S., Ursano, R. J., Epstein, R. S., Crowley, B., Vance, K. L., et al. (2000). Peritraumatic dissociation following motor vehicle accidents: Relationship to prior trauma and prior major depression. *Journal of Nervous and Mental Disease, 188*, 267–272.

Galea, S., Ahern, J., Resnick, H., Kilpatrick, D., Bucuvalas, M., Gold, J., & Vlahov, D. (2002). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346,* 982–987.

Galea, S., Boscarino, J. A., Resnick, H., et al. (2002). Mental health in New York City after the September 11 terrorist attacks: Results from two population surveys. In R. W. Manderscheid & M. J. Henderson (Eds.), *Mental health, United States* (Chapter 7). Washington, DC: Supt. of Docs, U.S. Government Printing Office.

Galea, S., Vlahov, D., Resnick, H., Ahern, J., Susser, E., Gold, J., et al. (2003). Trends of probable post–traumatic stress disorder in New York City after the September 11 terrorist attacks. *American Journal of Epidemiology, 158,* 514–524.

Grieger, T. A., Fullerton, C. S., & Ursano, R. J. (2003). Posttraumatic stress disorder, alcohol use, and perceived safety after the terrorist attack on the Pentagon. *Psychiatric Services, 54,* 1380–1382.

Hinton, D., Nathan, M., Bird, B., & Park, L. (2002). Panic probes and the identification of panic: A historical and cross–cultural perspec-

tive. *Culture, Medicine and Psychiatry, 26,* 137–153.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52,* 1048–1060.

Kilpatrick, D. G., Resnick, H. S., Freedy, J. R., Pelcovitz, D., Resick, P., Roth, S., et al. (1998). Posttraumatic stress disorder field trial: Evaluation of the PTSD construct. Criteria A through E. In T.A. Widiger, A.J. Frances, H.A. Pincus, R. Ross, M.B. First, W. Davis, & M. Kline (Eds.), *DSM–IV sourcebook* (pp. 803–844). Washington, DC: American Psychiatric Association.

▶King, D. W., King, L. A., Foy, D. W., Keane, T. M., & Fairbank, J. A. (1999). Posttraumatic stress disorder in a national sample of female and male Vietnam veterans: Risk factors, war–zone stressors, and resilience–recovery variables. *Journal of Abnormal Psychology, 108*, 164–170.

Koopman, C. C., Catherine, S., & David, A. (1994). Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, Calif., firestorm. *American Journal of Psychiatry, 151,* 888–894.

Marmar, C. R., Weiss, D. S., Schlenger, W. E., Fairbank, J. A., Jordan, B. K., Kulka, R. A., et al. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American Journal of Psychiatry, 151,* 902–907.

▶Marshall, G. N., & Orlando, M. (2002) Acculturation and peritraumatic dissociation in young Latino survivors of community violence. *Journal of Abnormal Psychology, 111,* 166–174.

▶North, C. S., Nixon, S. J., Shariat, S., Mallonee, S., McMillen, C., Spitznage, E. L., et al. (1999). Psychiatry disorders among survivors of the Oklahoma City bombing. *Journal of the American Medical Association, 282,* 755–762.

▶Ozer, E. J., Weiss, D. S., Best, S. R., & Lipsey, T. L. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta–analysis. *Psychological Bulletin, 129,* 52–73.

Reiss, S., & McNally, R. J. (1985). Expectancy model of fear. In S. Reis & R. R. Bootzin (Eds.), *Theoretical issues in behavior therapy* (pp. 107–121). San Diego, CA: Academic Press.

▶Resnick, H. S., Acierno, R., Kilpatrick, D., & Holmes, M. (2005). Description of an early intervention to prevent substance abuse and psychopathology in recent rape victims. *Behavior Modification*, 29, 156–188.

Robins, L.N., Helzer, J.E., Croughan, J., & Ratcliff, K.S. (1981). National Institute of Mental Health Diagnostic Interview Schedule. *Archives of General Psychiatry, 38,* 381–389.

▶Rothbaum, B. O., Foa, E. B., Riggs, D. S., Murdock, T., & Walsh, W. (1992). A prospective examination of post–traumatic stress disorder in rape victims. *Journal of Traumatic Stress, 5,* 455–475.

▶Schlenger, W. E., Caddell, J. M., Ebert, L., Jordan, B. K., Rourke, K. M., Wilson, D., et al. (2002). Psychological reactions to terrorist attacks: Findings from the National Study of Americans' Reactions to September 11. *Journal of the American Medical Association, 288*, 581–588.

▶Schmidt, N. B., & Koselka, M. (2000). Gender differences in patients with panic disorder: Evaluation cognitive mediation of phobic avoidance. *Cognitive Therapy and Research, 24,* 533–550.

▶Schuster, M. A., Stein, B. D., & Jaycox, L. H. (2001). A national survey of stress reactions after the September 11, 2001, terrorist attacks. *New England Journal of Medicine*, 345, 1507–1512.

▶Shalev, A., Sahar, T., Freedman, S., Peri, T., Glick, N., Brandes, D., et al. (1998). A prospective study of heart rate response following trauma and the subsequent development of posttraumatic stress disorder. *Archives of General Psychiatry, 55,* 553–559.

▶Simeon, D., Greenberg, J., Knutelska, M., Schmeidler, J., & Hollander, E. (2003). Peritraumatic reactions associated with the World Trade Center disaster. *American Journal of Psychiatry, 160,* 1702–1705.

Spitzer, R. L., Williams, J.B.W., Gibbon, M., & First, M. B. (1992). The Structured Clinical Interview for DSM–III–R (SCID). I. History, rational, and description. *Archives of General Psychiatry, 49,* 624–633.

▶Stewart, S. H., Taylor, S., & Baker, J.M. (1997). Gender differences in dimensions of anxiety sen-

sitivity. *Journal of Anxiety Disorders, 11,* 179–200.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.) New York: Harper Collins.

▶Tichenor, V., Marmar, C. R., Weiss, D. S., Metzler, T. J., & Ronfeldt, H. M. (1996). The relationship of peritraumatic dissociation and posttraumatic stress: Findings in female Vietnam theater veterans. *Journal of Consulting and Clinical Psychology, 64,* 1054–1059.

▶Tucker, P., Pfefferbaum, B., Nixon, S. J., & Dickson, W. (2000). Predictors of post–traumatic stress symptoms in Oklahoma City: Exposure, social support, peri–traumatic responses. *Journal of Behavioral Health Services and Research, 27,* 406–416.

Ursano, R. J., Fullerton, C. S., Epstein, R. S., Crowley, B., Vance, K., Kao, T.–C., et al. (1999). Peritraumatic dissociation and post traumatic stress disorder following motor vehicle accidents. *American Journal of Psychiatry, 156,* 1808–1810.

▶Van der Kolk, B. A., Brown, P., & Van der Hart, O. (1989). Pierre Janet on post–traumatic stress. *Journal of Traumatic Stress, 2,* 365–378.

▶Weiss, D. S., Marmar, C. R., Metzler, T. J., & Ronfeldt, H. M. (1995). Predicting symptomatic distress in emergency services personnel. *Journal of Consulting and Clinical Psychology, 63,* 361–368.

▶Zvolensky, M. J., Lejuez, C. W., Stuart, G. L., & Curtin, J. J. (2002). Experimental psychopathology in psychological science. *Review of General Psychology, 5,* 371–381.