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Differential Predictors of Transient Stress versus Posttraumatic Stress Disorder: Evaluating Risk Following Targeted Mass Violence

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Abstract

Schools have become a common incident site for targeted mass violence, including mass shootings. Although exposure to mass violence can result in significant distress, most individuals are able to fully recover over time, while a minority develop more pervasive pathology, such as PTSD. The present study investigated how several pre- and post-trauma factors predict posttraumatic stress symptoms (PTSS) in both the acute and distal aftermath of a campus mass shooting using a sample with known levels of pre-trauma functioning ($N = 573$). While the largest proportion of participants evidenced resilience following exposure to the event (46.1%), many reported high rates of PTSS shortly after the shooting (42.1%) and a smaller proportion (11.9%) met criteria for probable PTSD both in the acute and more distal aftermath of the event. While several pre-shooting factors predicted heightened PTSS after the shooting, prior trauma exposure was the only pre-shooting variable shown to significantly differentiate between those who experienced transient versus prolonged distress. Among post-shooting predictors, individuals reporting greater emotion dysregulation and peritraumatic dissociative experiences were over 4 times more likely to have elevated PTSS 8 months post-shooting compared to those reporting less dysregulation and dissociative experiences. Individuals with less exposure to the shooting and greater satisfaction with social support were more likely to recover from acute distress. Results suggest that, while pre-trauma factors may differentiate between those who are resilient in the aftermath of a mass shooting from those who experience heightened distress, several event-level and post-trauma coping factors help distinguish between those who eventually recover and those whose PTSD symptoms persist over time.

Keywords

school violence; posttraumatic stress; acute stress; trauma; logistic regression

Exposure to targeted mass violence can result in both acute distress and long-term negative consequences, such as PTSD (Galea et al., 2002; Littleton, Grills-Tauchel, & Axsom, 2009; North, Smith, & Spitznagel, 1994; Schwarz & Kowalski, 1991). Unfortunately,

schools have become a common incident site for targeted mass violence, including mass shootings (Stein, 2007). In the specific context of mass shootings, rates of PTSD range from 10 to 36% (Norris, 2007). Although exposure to a potentially traumatic event often results in transient symptoms of distress, most individuals are able to fully recover within a relatively short period of time and experience little or no disruption in healthy functioning (Shalev, 2002). The minority who develop PTSD face considerable difficulties in interpersonal relationships, occupational functioning, and quality of life, as well as high rates of comorbidity with other psychiatric disorders (Kessler, 2000). Thus, determining factors that help identify those at risk for developing PTSD following this increasingly occurring trauma type is critical for treatment and prevention efforts. The present study examined both prospective and acute markers of PTSD following a campus mass shooting in a sample of undergraduate women with known levels of pre-trauma functioning.

Prior research suggests that people experience a range of reactions following trauma exposure, including transient distress, pathology, and resilience (i.e., overall maintenance of healthy functioning; Bonanno, 2004). In instances of clinically significant distress, a diagnosis of PTSD is made after 1 month or more has transpired since the index trauma. Conversely, acute stress reactions describe trauma-related symptomatology that occur in the initial month following exposure to a potentially traumatic event and before a diagnosis of PTSD can be made (APA, 2000). Although acute stress reactions may lead to functional impairment in the immediate aftermath of trauma exposure, the majority of individuals fully recover within 6 to 16 months posttrauma (NSW Institute of Psychiatry and Centre for Mental Health, 2000). More specifically, the occurrence of acute stress following a mass shooting can be predictive of later PTSD (e.g., Classen, Koopman, Hales, & Spiegel, 1998); however, the vast majority of individuals eventually return to pre-trauma levels of functioning. For example, North and colleagues studied the impact of exposure to a public mass shooting 1 month (North, Smith, & Spitznagel, 1994), 1 year (North, Smith, & Spitznagel, 1997), and 3 years (North, McCutcheon, Spitznagel, & Smith, 2002) after the event. They found that while 28% of participants met criteria for PTSD one month after the event, the prevalence rate dropped to approximately 18% one and three years later. Thus, identifying factors that help differentiate between those who are resilient, those who experience transient distress, and those at risk for prolonged impairment would aid response efforts in the immediate aftermath of potentially traumatic events such as mass shootings.

A number of factors that increase risk for the development and maintenance of PTSD following trauma exposure have been identified in prior research (see Brewin et al., 2000 and Ozer et al., 2003 for reviews). Specifically, event-level factors, such as severity of exposure to a traumatic event (e.g., physical or emotional proximity), have been shown to be predictive of later pathology. Generally, greater exposure has been shown to predict heightened posttraumatic stress symptoms (PTSS; Brewin et al., 2000; Dirkzwager et al., 2006; Ozer et al., 2003), though Hughes et al. (2011) found that low-impact stressors (e.g., inability to confirm the safety of friends following the Virginia Tech shootings) also contributed to greater PTSS. Factors implicated in the immediate aftermath of trauma, such as peritraumatic dissociative experiences (i.e., the unusual experience of changes or distortions in one's perception of time, space, or self during or in the immediate aftermath of trauma exposure) have also been shown to substantially increase risk for subsequent PTSD.

A common explanation is that dissociation during or shortly after trauma exposure may interfere with the encoding and immediate processing of trauma memories, thereby increasing risk for PTSD (e.g., Briere, Scott, & Weathers, 2005). Other researchers suggest that dissociative experiences normatively occur in response to elevated arousal during trauma exposure, and may not necessarily confer risk for pathology (e.g., Sterlini & Bryant, 2002). Despite competing theories, a meta-analysis of 68 studies by Ozer and colleagues (2003) revealed a medium effect size for the contribution of peritraumatic dissociation to later PTSS, making it one of the strongest predictors of PTSD in their study.

Factors present prior to trauma exposure have also been implicated in the development of PTSD. Specifically, previous traumatic experiences and pre-existing PTSS have been shown to increase risk for continued pathology following trauma-exposure (Cougle, Resnick, & Kilpatrick, 2009; Suliman et al., 2009), including lifetime histories of abuse and assault (Brewin et al., 2000). Beyond trauma-relevant influences, factors related to general psychological distress, such as symptoms of depression or anxiety and functional impairment due to emotional or physical health concerns also confer risk for greater difficulties posttrauma (Brewin et al., 2000; Dirkzwager, et al., 2006; Ozer et al., 2003).

How one relates to their emotional experiences has also been shown to predict later functioning. Specifically, emotional coping strategies utilized both before and after exposure to a potentially traumatic event have been shown to differentiate between those who experience distress and those who are more resilient. Experiencing difficulties with emotion regulation (i.e., trouble with both the awareness and acceptance of emotional experiences, as well as difficulty utilizing appropriate and effective emotion regulatory strategies [Gratz & Roemer, 2004]) has been implicated in the onset and maintenance of PTSD (Eftekhar, Zoellner, & Vigil, 2009). More specifically, evidence suggests that avoidant or suppressive emotional responding following potentially traumatic events is associated with higher levels of PTSS (Marx & Sloan, 2005), which may include increased reliance on substances such as alcohol to help manage distress (Kushner, Abrams, & Borchardt, 2000). More broadly, experiential avoidance (EA; efforts to control or avoid unpleasant thoughts, feelings, and bodily sensations), has been associated with greater PTSS in prior research (Hayes, Wilson, Gilford, Follette, & Strosahl, 1996; Marx & Sloan, 2005; Tull & Roemer, 2003). Further, individuals are particularly at-risk for post-trauma difficulties if they demonstrate an inflexible pattern of coping, relying on maladaptive strategies utilized in the past and in response to new events (Westphal, Seivert, & Bonanno, 2010).

In addition to factors that increase risk for PTSD, several protective factors have been identified as influential in the aftermath of trauma-exposure. Specifically, satisfaction with posttrauma social support has been documented as potentially protective, with those reporting greater satisfaction responding more positively than those with less or dissatisfying support (Littleton et al., 2009; Brewin et al., 2000). Further, a meta-analysis of 77 studies by Brewin and colleagues found that lack of posttrauma social support was the strongest predictor of PTSD, beyond that predicted by pre-trauma and event-level factors such as previous traumatic experiences and trauma severity. An additional factor that may be protective in the aftermath of trauma is experiencing posttraumatic growth (Calhoun, Cann, Tedeschi, & McMillan, 2000), or the phenomenon in which an individual subjectively

experiences personal improvement in the aftermath of trauma. While investigated less rigorously than protective factors such as social support, posttraumatic growth has been shown to positively affect post-event functioning in previous research (Tedeschi & Calhoun, 2004; Zoellner & Maercker, 2006) and may aid recovery following targeted mass violence.

Methodological Limitations

The majority of research examining factors related to the development of PTSD following mass violence relies on retrospectively assessed pre-trauma factors. These studies are limited in the potential for recall errors and ambiguity regarding the direction of cause and effect (King et al. 2000; Vogt et al., 2007). Prospective research examining symptoms at a single time-point offer improvements, but are limited in their ability to examine factors impacting the course of PTSD. In fact, trauma-exposed individuals may follow multiple post-event trajectories that can be influenced by a number of pre, post, and peritraumatic factors (Norris, Tracy, & Galea, 2009; Bonanno, 2004). Though pre- and peritraumatic indicators are difficult to assess (i.e., requiring specific intervals between trauma and assessment in order to be detected), measurement of these factors is needed in order to gain a more complete understanding of responses following incidents of mass violence. Such prospective longitudinal designs are less common due to timing and methodological challenges; however, these designs provide critical information about factors implicated in the development and course of PTSD over time, including both prospective and acute markers. Thus, research lacking multiple time points, including pre- and peritraumatic assessment of risk and protective factors, does not adequately capture the etiology of posttrauma outcomes.

The Present Study

In order to examine prospective and acute risk factors for the development and maintenance of posttraumatic stress reactions, a web-based follow-up survey was administered to undergraduate women in the immediate and distal aftermath of a campus mass shooting. On February 14, 2008, a lone gunman opened fire in a Northern Illinois University (NIU) classroom, killing five students and wounding 21 people before taking his own life. At the time of the shooting, a sample of undergraduate women was enrolled in a longitudinal study of sexual revictimization. Data for the revictimization study were collected between September 2006 and February 14th, 2008, providing the opportunity to examine prospective risk and protective factors in the development of PTSD following a large-scale incident of targeted mass violence.

Data were collected at three time points. The initial assessment took place prior to the mass shooting event, allowing for pre-trauma assessment of risk and resilience factors, as well as rates of PTSS related to previously experienced potentially traumatic events. The second assessment was initiated 17 days after the campus mass shooting, with the majority of participants (70%) responding within 35 days of the event ($M = 29.5$ days). This assessment provided measurement of participants' acute reactions to the shooting. The third assessment took place approximately eight months post-shooting ($M = 7.94$ months), allowing for the measurement of more distal reactions to the event.

While numerous individual and environmental factors can be conceptually linked to the development and maintenance of PTSS, the present study focuses on predictors that have shown the most promise in previous research (e.g., Norris, 2007; Ozer et al., 2003; Brewin et al., 2000). Specifically, we hypothesized that participants with greater dysfunction pre-shooting would experience significantly elevated PTSS immediately post-shooting, as well as have higher risk of maintaining those symptoms over time, compared to those with less dysfunction pre-shooting. More specifically, we hypothesized that individuals with a higher occurrence of prior trauma (including abuse and assault histories), greater distress symptomatology, more instances of functional impairment, and greater reliance on maladaptive coping strategies (i.e., difficulties with emotion regulation, substance abuse, and emotional avoidance) would be at increased risk for experiencing distress following the mass shooting at NIU. In line with meta-analytic findings by Brewin et al. (2000) and Ozer et al. (2003), we hypothesized that factors operating during or after the mass shooting would have a somewhat stronger effect on PTSS maintenance than pre-trauma factors. Specifically, we predicted that greater proximity (exposure) to the mass shooting, increased rates of dissociation during and in the immediate aftermath of the shooting, and greater reliance on maladaptive coping strategies (i.e., substance abuse, emotional avoidance, and emotion dysregulation) post-shooting would predict significantly higher rates of PTSS in both the acute and more distal aftermath of the event, and that posttrauma variables would be more powerful predictors of PTSD relative to pre-trauma predictors. In line with previous findings, we predicted that more severe trauma exposure and greater peritraumatic dissociative processes would be particularly strong predictors of PTSD, potentially differentiating between those who experience transient versus prolonged distress. In addition, we posited that, even among those with elevated PTSS immediately post-shooting, more social support, greater satisfaction with social support, and the experience of posttraumatic growth in the acute aftermath of the shooting would be associated with decreased risk of subsequent PTSD 8 months later.

Method

Procedure

Data were collected from female participants who completed three waves of a longitudinal study approved by the NIU Institutional Review Board. The pre-shooting assessment (T1) was part of a prospective study of sexual revictimization collected between 2006 and February 14, 2008. The initial participant pool consisted of 1,045 students enrolled in an Introductory Psychology course and recruited from a mass testing pool. Participants were required to be women over the age of 18 years and fluent in English; previous trauma history or symptomatology were not selection criteria. Measures included at T1 were computer administered in individual sessions of approximately one hour. Participants received partial course credit for their participation.

The initial post-shooting online assessment (T2) was launched 17 days after the mass shooting. Of those that completed T1, 885 participants agreed to be recontacted for future research opportunities. Of those willing to be recontacted, 812 were determined to be current students at the time of the mass shooting and considered eligible for the post-shooting

assessment. Participants were sent an email that contained an individualized link to an online shooting-related survey. Of those invited to participate, 691 participants (85%) completed the post-shooting assessment at T2. The T2 online survey took approximately 30 minutes to complete. Participants received the option of partial course credit (relevant for those currently enrolled in Introductory Psychology) or \$40 for the completion of the post-shooting survey. The interval between T1 and T2 ranged from 2 to 82 weeks ($M = 30.88$, $SD = 21.7$). Time elapsed between the shooting and completion of the T2 assessment ranged from 17 to 100 days ($M = 29.5$, $SD = 16$), with 70% of participants providing data by 35 days post-shooting and 95% by 58 days post-shooting.

The second post-shooting online assessment (T3) was launched 7 months after the mass shooting ($M = 7.94$). Participants from the T2 sample ($n = 691$) were invited via e-mail to complete an additional follow-up survey online and a total of 588 participants completed the third session (81%). The T3 survey took approximately 30 minutes to complete. Participants could opt to receive \$40 compensation for participation. The average time elapsed between the shooting and T3 was 35 weeks ($SD = 3.1$).

Participants

The average age of participants was 19.4 years ($SD = 2.04$) at T1, 20.0 years ($SD = 2.53$) at T2, and 20.5 years ($SD = 2.13$) at T3. Among the final sample ($N = 573$), 71% of participants self-identified as European American, 18% as African American, and 3% as Asian American. Seven percent of individuals indicated they were of a different ethnic background and 1% chose not to respond to the question. Eight percent of participants endorsed a separate item indicating that they identified as Hispanic or Latina.

Measures

Time Intervals—To control for duration effects on the relationships between variables measured at T1, T2, and T3, the time elapsed between the T1 and T2 assessments was calculated in weeks. The time elapsed between the mass shooting on February 14, 2008 and the T2 assessment, as well as time elapsed between the mass shooting and the T3 assessment, were also calculated in weeks.

Traumatic Life Events Questionnaire (TLEQ)—The TLEQ (Kubany et al., 2000a) is a brief, broad-spectrum measure of trauma exposure that has demonstrated good psychometric properties (Kubany et al., 2000a). Respondents indicate the frequency of experiencing 22 potentially traumatic events as specified in Criterion A1 of the diagnostic criteria for PTSD in the DSM-IV-TR (APA, 2000). The version of the TLEQ used in the present study was modified to expand the assessment of CSA and the scale was administered in a condensed version after T1 (i.e., some “nonessential” trauma categories were combined). In the present study, participants completed the TLEQ at T1 to report lifetime trauma history. Participants indicated whether they had experienced each of 22 potentially traumatic events in their lifetime, and a count score of events experienced (versus never experienced) was calculated across the 22 items.

In addition, responses from the TLEQ were used to provide information about childhood sexual abuse and adolescent sexual assault history. Specifically, a single item from the TLEQ were used to assess experiences of childhood sexual abuse at 12 years old or younger (i.e., “*Before your 13th birthday: Did anyone touch or fondle your body in a sexual way or make you touch or fondle their body in a sexual way?*”), and adolescent sexual assault from ages 15–17 (i.e., “*After your 15th birthday and before your 18th birthday: Did anyone touch sexual parts of your body or make you touch sexual parts of their body against your will or without your consent?*”). Responses were collapsed into a dichotomy of ever experienced versus never experienced.

Distressing Events Questionnaire (DEQ)—The DEQ (Kubany, Leisen, Kaplan, & Kelly, 2000b) is a 17-item self-report measure of PTSS severity. Designed to be used in conjunction with the TLEQ, the DEQ assesses the 17 symptoms of PTSD according to DSM-IV criteria (APA, 2000) experienced in the past 30 days along three clusters: avoidance, reexperiencing, and hyperarousal. Symptom severity is assessed using a 5-point Likert scale ranging from 0 (*Absent or did not occur*) to 4 (*Present to an extreme or severe degree*). The DEQ has demonstrated good short-term test-retest reliability, excellent internal consistency, and good convergent and discriminant validity (Kubany et al., 2000b). The DEQ was administered at each of the three time points. For the pre-shooting assessment, participants were instructed to answer items based on the most distressing traumatic event they had experienced. For both post-shooting assessments, participants were instructed to answer the DEQ based on the mass shooting event. Total PTSD scores were calculated as a sum across all 17 items.

Severe Childhood Physical Abuse—Items derived from the Family Experiences Questionnaire (Briere & Runtz, 1990) were used to assess for severe childhood physical abuse at the age of 14 or younger. Participants were asked to rate the frequency of three items assessing consequences of CPA (i.e., “*How often did punishment from the person most responsible for taking care of you leave you with bruises? Cuts or scratches? Welts?*”) for up to two caregivers. Items were averaged for each caregiver and participants were assigned the maximum score across caregivers.

Difficulties in Emotion Regulation Scale (DERS)—The DERS (Gratz & Roemer, 2004) is a 36-item measure assessing six distinct dimensions of emotion regulation: (1) lack of awareness of emotional responses, (2) lack of clarity of emotional responses, (3) nonacceptance of emotional responses, (4) limited access to emotion regulation strategies perceived as effective, (5) difficulties controlling impulses when experiencing negative emotions, and (6) difficulties engaging in goal-directed behaviors when experiencing negative emotions. Each item is rated on a 5-point Likert scale based on how often participants believe each item pertains to them, ranging from 1 (*Almost never*) to 5 (*Almost always*). The DERS has demonstrated good psychometric properties in prior research (Gratz & Roemer, 2004). A T1 DERS mean score was calculated for use in the present analyses, and the internal consistency estimate was good ($\alpha = .94$).

Emotion Regulation Strategies Post-Shooting (ERSPS)—To assess T2 coping strategies for shooting-related distress, participants completed the DERS (Gratz & Roemer, 2004) with an altered instructional set focusing on strategies in response to the mass shooting. Specifically, participants were asked to respond to DERS items using the same Likert scale with the following instructions: “*Since the mass shooting at NIU on February 14, 2008, please indicate how often the following statements apply to you.*” Total mean ERSPS scores were calculated by averaging across the 36 items and the internal consistency estimate at T2 was excellent ($\alpha = .94$).

Acceptance and Action Questionnaire - II (AAQ-II)—The AAQ-II (Bond et al., 2011) is a 7-item self-report inventory used to assess one’s tendency to respond with psychological inflexibility and experiential avoidance (e.g., “*I am afraid of my feelings; my painful memories prevent me from having a fulfilling life*”). Participants rate items on a 7-point Likert scale ranging from 1 (*Never true*) to 7 (*Always true*). The AAQ-II has demonstrated good psychometric properties, including good convergent, discriminant, and incremental validity (Bond et al., 2011). Similarly, the test-retest reliabilities at 3 and 12 months were .81 and .79 respectively. Further, the mean internal consistency estimate was .81 with a range of .76 to .86 across samples (Bond et al., 2011). An AAQ-II total mean score was calculated for use in the present analyses and internal consistency estimates at both T1 ($\alpha = .84$) and T2 ($\alpha = .91$) were good.

Symptom Checklist - 10 (SCL-10)—The SCL-10 (Rosen et al., 2000) was developed to provide a brief measure of general psychological distress that can be used with heterogeneous clinical populations. The SCL-10 is comparable to the General Severity Index of the Symptom Checklist-90 (SCL-90), a well-validated measure of psychological distress developed by Derogatis, Lipman, and Covi (1973). Items from each of the original nine subscales of the SCL-90 are included and reflect symptoms of depression, somatization, and phobic anxiety (e.g., “*During the past 30 days, how much have you been distressed by feeling blue? Difficulty making decisions? Trouble getting your breath?*”). Items are scored on a 5-point Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely*), with higher scores indicating greater distress. Total T1 mean scores were calculated, and the internal consistency estimate was good ($\alpha = .82$).

Role Limitations Due to Physical and Emotional Problems—Items from the shortened (12 item) version of the Rand Health Quality of Life Items (SF-12; Ware, Kosinski, & Keller, 1996) were administered as indicators of health-related quality-of-life. The SF-12 was developed in order to provide a quick, straightforward, and accessible measure of physical and mental health and sufficient test-retest correlations have been observed (Ware, Kosinski, & Keller, 1996). In the present study, four items examining role limitations due to physical problems, and three items examining role limitations due to emotional problems were included. In terms of physical health, participants were asked “*During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?*” (1) “*Cut down the amount of time you spent on work or other activities?*” (2) “*Accomplished less than you would like?*” (3) “*Were limited in the kind of work or other activities?*” and (4) “*Had difficulty performing*

the work or other activities [for example, it took extra effort]?” In terms of emotional health, participants were asked *“During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems [such as feeling depressed or anxious]: (1) Cut down the amount of time you spend on work or other activities?” (2) “Accomplished less than you would like?” and (3) “Didn’t do work or other activities as carefully as usual?”*. Items were administered at T1 and a count score was calculated for physical and emotional role limitations separately.

Pre- and Post-Shooting Heavy Drinking—Substance use items (Cooper, Wood, Orcutt, & Albino, 2003) that assess regular alcohol use with a series of quantity and frequency assessments were used to assess for heavy drinking at T1 and T2. At T1, heavy drinking was assessed as a composite of 6-month frequency of drinking 5 or more drinks on one occasion and frequency of drinking to intoxication. At T2, heavy drinking was assessed as a composite of two ratios: (1) number of days drinking 5 or more drinks on one occasion divided by the number of days between the shooting and the T2 interview and (2) number of days drinking to intoxication divided by the number of days between the shooting and the T2 interview. The resulting variable was non-normal and was Blom transformed and rank normalized which resulted in nonsignificant skew and kurtosis levels. Mean scores were calculated for pre- and post-shooting heavy drinking items, and the internal consistency estimates were good (T1, $\alpha = .92$; T2 $\alpha = .87$).

Physical Exposure to Mass Shooting—At T2, participants completed a 12-item self-report measure of exposure adapted from the Littleton et al. (2009) Virginia Tech Shooting Exposure measure. Participants were asked a series of yes/no questions about their personally experienced exposure to various aspects of the mass shooting at NIU (e.g., *“Were you on campus at the time of the shooting? Were you in a building placed on lockdown? Did you hear gunfire? Do you know anyone that was wounded in the shootings?”*). Scale items were summed to create an exposure total count score, reflecting dose of exposure.

Peritraumatic Dissociative Experiences Questionnaire (PDEQ)—The PDEQ (Marmar et al., 1994; Marmar, Metzler, & Otte, 2004) is a self-report measure of peritraumatic dissociation. A recent examination of the latent structure of the PDEQ revealed that the measure is best characterized by two 4-item factors representing 1) altered awareness and 2) depersonalization/derealization. The first factor failed to predict post-trauma symptomatology, while the second factor was predictive of symptoms of depression, anxiety, and acute stress disorder post-trauma (Brooks et al., 2009). The 4 PDEQ items corresponding to peritraumatic depersonalization/derealization (i.e., *“My sense of time changed – things seemed to be happening in slow motion,” “What was happening seemed unreal to me, like I was in a dream or watching a movie or play,” “I felt as though I was a spectator watching what was happening to me,” and “There were moments when my sense of my own body seemed distorted or changed”*) were administered at T2. Items were rated on a 5-point Likert scale ranging from 1 (*Not at all true*) to 5 (*Extremely true*). When completing the items, participants were asked to focus specifically on their experiences and reactions *“during the mass shooting at NIU.”* The internal consistency estimate was .79.

Posttraumatic Growth Inventory (PTGI six items)—Six items derived from the 10-item short form of the PTGI (Cann et al., 2010) were used for assessing positive outcomes that can be experienced following exposure to a traumatic event. Participants rated items on a 6-point Likert scale ranging from 0 (*I did not experience this change as a result of the shooting*) to 5 (*I experienced this change to a very great degree as a result of the shooting*). Specifically, participants were asked to indicate their perceived change in the following areas: (1) Appreciation of Life (i.e., “*My priorities about what is important in life*”), (2) Spiritual Change (i.e., “*A better understanding of spiritual matters*” and “*I have a stronger religious faith*”), (3) New Possibilities (i.e., “*I established a new path for my life*”), (4) Personal Strength (i.e., “*I discovered that I’m stronger than I thought I was*”), and (5) Relating to Others (i.e., “*I learned a great deal about how wonderful other people are*”). Total mean T2 PTGI scores were calculated and the internal consistency estimate was good ($\alpha = .90$).

Satisfaction with Social Support Available Post-Shooting—Utilizing a 5-point scale ranging from 0 (*Not at all*) to 5 (*Extremely*), participants were asked to rate the following item: “*To what extent were you satisfied with the support available to you following the mass shooting at NIU on February 14, 2008?*”. This single item was used as an indicator of satisfaction with available social support following the shooting event.

Multidimensional Scale of Perceived Social Support (MSPSS)—The MSPSS (Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item measure of general social support. Items focus primarily on emotional and instrumental support (e.g., “*I can count on my friends when things go wrong*,” “*My family really tries to help me*”) and respondents are asked to indicate how much they agree with each statement using a scale of 1 (*Very strongly disagree*) to 7 (*Very strongly agree*). The MSPSS has demonstrated good psychometric properties in previous research (Zimet et al., 1988) and the T2 internal consistency estimate for the present sample was .93.

Results

Descriptive Statistics and Preliminary Analyses

Based on sensitivity and specificity analyses, Kubany and colleagues (2000b) recommend a DEQ score of 18 as a cutoff for probable PTSD in women. Based on these recommendations, a three-level variable was created based on probable PTSD at T2 and T3 with 0 = *No probable PTSD at T2 or T3* ($n = 264$), 1 = *Probable PTSD at T2 only* ($n = 241$) and 2 = *Probable PTSD at T2 and T3* ($n = 68$). Fifteen cases had missing PTSS data at T2 or T3 and were removed from further analyses. Two participants reported PTSD at T3 only and were not included, as there was insufficient sample size to examine this delayed onset group. Of the 573 individuals included in the main study analyses, 102 participants reported probable PTSD prior to the mass shooting (T1; 17.8%). Of the individuals who reported probable PTSD at T1, 52 reported probable PTSD at T2 (21.6% of all participants reporting probable PTSD at T2) and 32 reported probable PTSD at both T2 and T3 (47.1% of all participants reporting probable PTSD at both T2 and T3).

In regard to shooting exposure, 449 (78.4%) participants in the current sample were on campus at the time of the shooting, 398 (69.5%) saw emergency responders or police surrounding campus buildings, and 282 (49.2%) were in a building that was placed on lockdown during the shooting. One-hundred-and-twenty-five (21.8%) participants reported seeing individuals who had been wounded or killed, 197 (34.4%) reported knowing someone that was wounded during the shooting, and 130 (22.7%) knew someone who had died in the shooting. Thirty-six participants (6.3%) heard the sound of gunfire, 22 (3.8%) were in the building where the shooting took place, 12 (2.1%) saw the gunman. Eight (1.4%) participants saw the gunman firing his weapon, 1 participant (.2%) reported being fired upon by the gunman, and 2 participants (.3%) reported being hurt in the shooting.

To assess differences due to attrition between time points, participants responding at T2 ($n = 691$) were compared to eligible non-responders ($n = 122$) on demographic variables (i.e., age, race/ethnicity) and variables measured at T1. In comparison to all other participants, Non-Hispanic White participants were more likely to complete T2, $\chi^2(1, N = 793) = 5.14, p < .05$. Participants who attrited reported higher levels of experiential avoidance compared to those who completed T2, $t(809) = 2.22, p < .05$, as well as more difficulties with emotion regulation, $t(807) = 2.14, p < .05$. To assess differences due to attrition between T2 and T3, those responding at T3 ($n = 588$) were compared with those who did not respond ($n = 103$) on demographics, T2 PTSS, and T2 predictor variables. Non-Hispanic White participants were more likely to complete T3 than participants from all other race/ethnicity categories $\chi^2(1, N = 674) = 12.41, p < .001$. In addition, participants who completed T3 reported greater social support at T2 compared to those who attrited, $t(683) = 3.98, p < .001$. Participants also differed in terms of peritraumatic dissociative experiences, with those who completed T3 reporting greater peritraumatic dissociation at T2 than those who did not complete T3, $t(683) = 205, p < .05$.

Sample size guidelines for multinomial logistic regression indicate a minimum of 10 cases per independent variable (Hosmer & Lemeshow, 2013). Due to sample size considerations in the probable PTSD at both T2 and T3 category, dichotomous dummy-coded variables were created from the three-level probable PTSD outcome for use in bivariate correlation analyses with all possible pre- and post-shooting predictors. Specifically, correlation analyses were used to determine which predictor variables were most strongly related to probable PTSD at the bivariate level, and the six most strongly correlated pre- and post-shooting predictors were included in the present analyses (see Table 1). Selected pre-shooting predictors of probable PTSD included T1 PTSS, T1 distress symptoms (SCL-10), T1 EA, T1 activities impaired due to emotional problems (SF-12 items), T1 difficulties with emotion regulation, and T1 prior traumatic experiences. Selected post-shooting predictors included T2 difficulties with emotion regulation, T2 peritraumatic dissociative experiences, T2 EA, T2 exposure to the mass shooting, T2 posttraumatic growth, and T2 satisfaction with social support available post-shooting. Scale level predictors were unit standardized prior to analysis. Tolerance and Variance Inflation Factor (VIF) statistics for each predictor variable were within acceptable range (<10 and $> .1$), suggesting no problems with multicollinearity.

Multinomial Logistic Regression Models

Pre- and post-shooting multinomial logistic regression models using maximum likelihood estimation and Monte Carlo numerical integration were conducted in Mplus 7.0, as outlined by Muthén and Muthén (1998–2012). Mplus employs a robust full-information maximum-likelihood estimation procedure for handling missing data, which assumes missing data are unrelated to the outcome variable (missing at random). In the present analyses, the three-level probable PTSD variable was included as the outcome, and No probable PTSD at either T2 or T3 and probable PTSD at T2 only were used as referent categories.

Results from the pre-shooting models indicated that the predictor model fit significantly better than the intercept-only model ($p < .001$). Similarly, the overall fit of the models appeared good according to non-significant Pearson and Deviance Goodness-of-Fit Indices. Parameter estimates for pre-shooting predictors are listed in Table 2. Comparisons between PTSD groups (either at T2 only or at both T2 and T3) and the no-PTSD-category indicated that higher rates of pre-shooting PTSS, psychological distress, and the number of activities impaired due to emotional problems significantly increased the odds of probable PTSD in both the acute and distal aftermath of the shooting, as compared to reporting no probable PTSD. Higher endorsement of prior traumatic experiences increased the odds of probable PTSD at both T2 and T3 (as compared to no probable PTSD), but the estimate for probable PTSD at T2 only was non-significant. Pre-shooting EA and T1 difficulties with emotion regulation did not significantly differentiate between probable-PTSD (either at T2 only or at both T2 and T3) and no-PTSD. Comparisons between the two PTSD groups (i.e., probable PTSD at T2 only and probable PTSD at both T2 and T3) were non-significant for each of the predictors except for prior traumatic experiences. Specifically, higher endorsement of prior traumatic experiences increased the odds of probable PTSD at both T2 and T3 (as compared to probable PTSD at T2 only), indicating that this pre-shooting variable significantly differentiated between those who experienced acute versus prolonged distress after the shooting.¹

Results from the post-shooting models indicated that the model with predictors fit significantly better than the intercept-only model ($p < .001$) and the overall fit of the models were good according to non-significant Pearson and Deviance Goodness-of-Fit Indices. Parameter estimates for T2 predictors are listed in Table 2. Comparisons between PTSD groups (either at T2 only or at both T2 and T3) and the no-PTSD-category indicated that greater post-shooting emotion regulation difficulties, peritraumatic dissociative experiences, posttraumatic growth, and physical exposure to the mass shooting increased the odds of probable PTSD in both the acute and distal aftermath of the shooting, as compared to no probable PTSD. Greater satisfaction with available social support post-shooting significantly decreased the odds of probable PTSD both in the acute and more distal aftermath of the shooting. Greater T2 EA increased the odds of having probable PTSD at T2 only (as compared to no PTSD), but not probable PTSD at both T2 and T3. Comparisons between the two probable PTSD categories indicated that more difficulties with emotion regulation

¹Results (i.e., significance levels and odds ratio values) for each of the pre-shooting logistic regression models were not appreciably different when weeks elapsed between T1 and T2 was modeled with other T1 predictors.

post-shooting and greater proximal exposure to the event significantly increased the odds of reporting probable PTSD at both T2 and T3 (as opposed to T2 only). In addition, less satisfaction with available social support following the shooting increased the odds of reporting probable PTSD at both T2 and T3 (as opposed to T2 only).²

Lastly, combined models with pre- and post-shooting predictors were run. T1 EA and T1 difficulties with emotion regulation were not included in the combined model, as these variables were also measured at T2. More specifically, including the T2 variables when T1 variables were retained results in the T2 variable reflecting a change in the construct controlling for T1 levels. Thus, we elected to remove the more distal, non-significant predictors. The combined predictor models fit significantly better than the intercept-only model ($p < .001$) and the overall fit was good. Parameter estimates and odds ratios for the combined models are provided in Table 2. In the models comparing PTSD-groups (T2 only or T2 and T3) and the no-PTSD-group, greater T1 PTSS, T2 emotion regulation difficulties, T2 peritraumatic dissociative experiences, exposure to the shooting, and posttraumatic growth increased the odds of both acute and distal probable PTSD. Less satisfaction with social support increased the odds of both T2 probable PTSD, as well as T2 and T3 probable PTSD (as compared to no PTSD). Overall, post-shooting emotion dysregulation and peritraumatic dissociative experiences predicted the greatest variance in probable PTSD (both at T2 only and at both T2 and T3), compared to the no-PTSD-group, controlling for each of the other predictors included in the model. Comparisons between the two PTSD groups indicated that for each standard deviation increase in post-shooting difficulties with emotion regulation and proximal exposure to the mass shooting, the odds of reporting probable PTSD at both T2 and T3 significantly increased, compared to those reporting probable PTSD at T2 only.

Discussion

The primary goal of the present study was to examine how several pre- and post-trauma factors predict PTSS in both the acute and more distal aftermath of a campus mass shooting. While a large portion (42.1%) of the present sample endorsed significant PTSS shortly after the shooting, a much smaller proportion (11.9%) met criteria for probable PTSD related to the mass shooting both shortly after and approximately 8 months following the event. Thus, the present study also sought to discern what factors best differentiate between those who recovered after an initial onset of PTSS following exposure to a potentially traumatic event and those whose symptoms persisted over time.

Results are consistent with prior research on rates of PTSD following mass shootings (Norris, 2007). While the largest proportion of participants fell into a resilient (i.e., no-probable-PTSD) category ($n = 264$; 46.1%), many participants reported experiencing high rates of PTSS in the acute aftermath of the shooting (42.1%). Given that the initial post-shooting assessment was completed on average 27 days following the event, it is likely that individuals reporting high levels of PTSS at this time ($n = 241$) were experiencing an acute

²Results (i.e., significance levels and odds ratio values) for each of the post-shooting logistic regression models were not appreciably different when weeks elapsed between the mass shooting and T2 was modeled with other T2 predictors.

stress reaction or short-term elevations in PTSS. Conversely, those individuals whose symptoms persisted until approximately 8 months following the event ($n = 68$) may be more appropriately identified as those meeting criteria for a diagnosis of PTSD (APA, 2000, 2013). Further, the T3 probable PTSD prevalence rate (11.9%) observed in the present sample resembles that reported by students 3 to 4 months following the 2007 shootings at Virginia Tech (i.e., 15.4%, Hughes et al., 2011).

Several significant prospective predictors of PTSD emerged from the present analyses. Specifically, pre-shooting PTSS and general distress symptoms seemed to distinguish between those who experienced heightened PTSS immediately post-shooting and those who were more resilient. Individuals who experienced heightened PTSS in both the acute and more distal aftermath of the shooting endorsed higher rates of pre-shooting PTSS, general distress symptoms, role limitations due to emotional problems, and prior traumatic experiences compared to more resilient individuals. These findings are consistent with previous research suggesting that pre-trauma functioning has a substantial impact on post-trauma functioning (Cogle et al., 2009; Dirkzwager, et al., 2006; Ozer et al., 2003; Suliman et al., 2009). Further, it is important to remember that, in logistic regression, the effect for any one predictor is the effect of that variable controlling for all the other predictors in the model. Given variables such as prior trauma exposure and existing PTSS were included, one can appreciate the magnitude of variables that accounted for additional, significant variance in post-shooting probable PTSD, such as general distress and role limitations due to emotional problems. Prior traumatic experiences was the only pre-shooting variable shown to significantly differentiate participants who experienced transient (T2 only) versus prolonged (both T2 and T3) symptoms of PTSD.

Several significant post-shooting factors also emerged from the present analyses. Specifically, emotion regulation strategies post-shooting, peritraumatic dissociative experiences, proximal exposure to the mass shooting, posttraumatic growth, and satisfaction with available social support significantly distinguished between those reporting no probable PTSD at any time point from those reporting high PTSS in the acute and distal aftermath of the event. More specifically, post-shooting difficulties with emotion regulation, peritraumatic dissociative experiences, shooting exposure, and posttraumatic growth each served as substantial risk factors for subsequent PTSS, while satisfaction with available social support emerged as a significant protective factor. T2 EA differentiated between high PTSS at T2 (versus no PTSD), but not between no PTSD and probable PTSD at both study time points. Overall, findings are consistent with prior research and the present hypotheses (e.g., Brewin et al., 2000; Littleton et al., 2009; Ozer et al., 2003), excluding findings related to posttraumatic growth. Emotion regulation difficulties and peritraumatic dissociative experiences were particularly strong distinguishers between the no-PTSD-group and those with probable PTSD at both time points. Specifically, individuals with high dysregulation and greater peritraumatic dissociative experiences post-shooting were over 4 times more likely to have elevated PTSS approximately 8 months post-shooting than those reporting fewer post-shooting emotion regulation difficulties and dissociative experiences. This is in line with prior research documenting peritraumatic dissociation as an especially strong predictor of later difficulties (Marmar, Weiss, & Metzler, 1998; Ozer et al., 2003). In terms of differentiating between the two symptomatic groups, individuals with greater emotion

regulation difficulties, peritraumatic dissociative experiences, and proximal exposure to the shooting were significantly more likely to have persistent PTSS 8 months post-shooting compared to those with elevated symptoms at T2 only.

Surprisingly, pre-shooting difficulties with emotion regulation and pre-shooting EA did not emerge as significant predictors of probable PTSD in either the acute or distal aftermath of the mass shooting. This is contrary to prior research indicating that inflexible reliance on maladaptive coping strategies contributes to the onset and maintenance of PTSD (e.g., Marx & Sloan, 2005; Westphal et al., 2010). It is possible that related pre-shooting variables, such as pre-shooting PTSS and general distress, may have accounted for similar variance in probable PTSD as pre-shooting emotional avoidance and dysregulation. Similarly, emotion regulation strategies post-shooting may have sufficiently accounted for variance in post-shooting PTSS beyond the avoidance of negative internal experiences alone.

Findings related to posttraumatic growth, while significant, were not in the expected direction. Specifically, rates of growth following the shooting were significantly predictive of probable PTSD at both time points. Previous research has distinguished growth from psychological resilience following trauma exposure and suggests that the experience of distress is a prerequisite for growth to transpire (Tedeschi & Calhoun, 2004). For especially resilient individuals, growth after trauma is unlikely to occur (Bonanno, 2004) and a dose-response-relationship between trauma severity and posttraumatic growth has been observed (e.g., Helgeson, Reynolds, & Tomich, 2006). It may be that, without significant distress and personal struggle, it is less likely that an individual would attempt to explain and/or ascribe significant meaning to a traumatic event. The present findings suggest that posttraumatic growth was not protective in the aftermath of the shooting, as reports of growth did not distinguish between those with acute distress and those with probable PTSD 8 months post-shooting. However, previous research has found evidence for a curvilinear relationship between PTSS and posttraumatic growth, such that trauma survivors with low or high levels of growth reported less PTSS than those with intermediate levels of growth (see Kleim & Ehlers, 2009). Additionally, there is significant debate regarding measurement of growth following trauma. Frazier et al. (2009) suggest that self-report measures assess perceived versus actual growth. Similarly, Hobfoll, Galea, Johnson, & Palmieri (2007) found that behavioral growth (i.e., positive adaptation posttrauma) was related to positive outcomes, whereas self-reported growth (i.e., cognitions and intentions related to growth) was not. As such, future investigations might examine potential differences between self-reported versus behavioral growth following exposure to mass violence. Similarly, examination of whether perceived growth promotes posttrauma recovery over time (as opposed to occurring in conjunction with persistent PTSS), is warranted.

Overall, results highlight the importance of pre-trauma functioning in predicting those who will experience distress in the acute and distal aftermath of a potentially traumatic event from those who remain largely unaffected by exposure to trauma. In addition, comparisons between participants who recover from an initial acute stress reaction and those with probable PTSD approximately 8 months after the shooting highlight the importance of posttrauma factors in predicting who will recover from initial distress. Results from the combined pre- and post-shooting models revealed that emotion regulation difficulties

posttrauma and peritraumatic dissociative experiences are particularly strong post-event factors that distinguish between individuals who demonstrate resilience following trauma exposure and those who experience prolonged distress. Further, emotion regulation difficulties reported posttrauma helped distinguish between those who recovered from initial distress and those whose PTSS persisted over time. This is in line with findings by Brewin and colleagues (2000) indicating that factors operating during or following trauma exposure have somewhat stronger effects than pre-trauma factors. However, interpretation of relative predictive ability of pre- versus posttrauma predictors of PTSS should take into account that more proximal predictors (e.g., predictors at T2) will inevitably demonstrate stronger associations with outcomes than more distal predictors (e.g., predictors at T1; Brewin et al., 2000). Thus, the finding that pre-shooting variables predict the development of PTSD better than its maintenance may be, in part, due to this phenomenon.

The finding that greater posttrauma emotion regulation difficulties and less satisfaction with social support available post-shooting are significant post-shooting predictors of PTSD maintenance (versus recovery) has potential clinical implications. Specifically, these factors (as opposed to trauma history and proximal exposure to the event) can be potentially addressed in the aftermath of trauma. Individuals who struggle with processing and regulating negative internal experiences may be particularly vulnerable to experiencing prolonged dysfunction following trauma exposure. As such, intervention efforts aimed at helping survivors develop more adaptive emotion regulation skills may help counter efforts to avoid or disengage from trauma-related thoughts, feelings, and experiences. Similarly, greater satisfaction with available social support emerged as both an acute and distal protective factor in the present study. As such, organization- or community-wide effort to increase the presence and efficacy of social support following mass violence is likely a worthwhile pursuit, with potentially lasting effects. These factors are particularly relevant given findings by Briere et al. (2005) that, while dysfunctional responses at the time of trauma may increase risk for posttrauma distress, the continued use of maladaptive coping strategies is a better predictor of lasting PTSD. Thus, promoting the development of adaptive emotional management strategies and providing adequate, responsive social support seem to be important clinical targets for survivors of mass violence.

Several factors related to PTSD warrant consideration when interpreting the present findings. First, it is likely that a number of the participants reporting heightened PTSS in the present sample did not meet diagnostic criteria for PTSD due to low-impact exposure to the shooting (e.g., participants reporting having been on campus during the shooting or having seen police surrounding buildings on campus). As stated in the DSM-IV-TR, a person must have “experienced, witnessed, or been confronted with an event that involves actual or threatened death or injury, or a threat to the physical integrity of self or others” (p. 467, Criterion A1, APA, 2000). However, findings related to the mass shooting at Virginia Tech indicate that low-impact shooting-related stressors (i.e., inability to confirm the safety of friends) significantly contributed to diagnostic levels of PTSS (i.e., Hughes et al., 2011), despite likely not meeting A1 criteria. As such, the impact of varying levels of mass violence exposure may be significant, despite what is suggested by the diagnostic criteria for PTSD. Second, while participants in the original revictimization study were not selected on the basis of trauma history or symptomatology, approximately 17.8% of the present sample

reported probable PTSD prior to the mass shooting at NIU. Further, 22% of those reporting probable PTSD at T2 and 47% of those with probable PTSD at both T2 and T3 had clinically significant PTSS prior to the shooting. Thus, although the reference event for the DEQ was the shooting, it is possible that posttrauma distress reported in the present study is not primarily related to the shooting for some individuals, or that exposure to the mass shooting contributed to the maintenance of PTSS over time.

The present study has several limitations. First, the sample was comprised of female undergraduate students, limiting generalizability. Second, data were obtained through self-report, which can result in response and presentation biases. Third, the size of the group reporting probable PTSD both shortly after and approximately 8 months post-shooting ($n = 68$) was relatively small, limiting the number of predictors that can be reliably tested and the odds ratios obtained. Fourth, two participants were not included in the final analyses due to insufficient sample size for a delayed onset probable PTSD group. Future research should examine factors implicated in delayed onset PTSD following targeted mass violence. Fifth, only two posttrauma assessment points were used. As a result, we were unable to examine more distal (and perhaps more precise) patterns of post-shooting adjustment. While the aim of the present study was to examine factors distinguishing between acute distress and PTSD in the time period shortly following a mass shooting, an account of PTSD symptom trajectories following the NIU shooting across 31 months is available (see Orcutt, Bonanno, Hannan, & Miron, 2014). Sixth, while the majority of participants completed the T2 assessment within 1 month from the shooting, a number of participants completed the assessment at a later time point (e.g., 2 months post-shooting). This response range limited our ability to view elevated T2 symptoms as suggestive of an acute stress reaction (versus a diagnosis of PTSD) across the entire sample. Nevertheless, the present study results do distinguish between those who experienced short-versus long-term elevations in PTSS given the more distal follow-up assessment at T3.

Despite these limitations, the present study has several key strengths, including the use of multi-wave data in a sample with known pre-trauma functioning. Further, the relatively brief latency between the campus mass shooting and T2 data collection for the majority of participants offers unique insight on both the acute and more distal effect of this increasingly-occurring trauma type. The present study suggests that, while pre-trauma factors may differentiate between those who are resilient in the aftermath of a mass shooting from those who experience heightened distress, several event-level and post-shooting coping factors may help distinguish between individuals who experience acute stress from those whose symptoms of PTSD persist over time.

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Table 1

Correlations and Descriptive Statistics for Main Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. T1 PTSS	-																					
2. T1 Gen Distress	.45	-																				
3. T1 Emo Impair	.38	.47	-																			
4. T1 Phys Impair	.24	.28	.34	-																		
5. T1 Prior Trauma	.46	.27	.24	.18	-																	
6. T1 CPA	.28	.15	.14	.14	.26	-																
7. T1 CSA	.15	.01	.06	.04	.19	.19	-															
8. T1 AdSA	.22	.12	.15	.06	.26	.13	.26	-														
9. T1 EA	.52	.69	.53	.25	.28	.20	.10	.17	-													
10. T1 DER	.46	.62	.51	.25	.20	.11	.06	.13	.69	-												
11. T1 Hvy Drink	.14	.19	.14	.13	.04	.11	-.11	.07	.16	.22	-											
12. T2 ERSPTS	.38	.46	.42	.17	.21	.17	.05	.10	.52	.60	.15	-										
13. T2 PDE	.22	.21	.20	.16	.17	.09	.06	.07	.22	.19	.11	.42	-									
14. T2 Shoot Exp	.15	.09	.04	.04	.09	.05	.05	.06	.10	.12	.16	.22	.27	-								
15. T2 PTG	.03	.06	.04	.09	.15	-.02	.01	.06	.03	-.01	.02	.08	.21	.16	-							
16. T2 EAPS	.44	.51	.42	.22	.30	.19	.09	.12	.64	.54	.10	.75	.36	.23	.12	-						
17. T2 Hvy Drink	.09	.14	.10	.12	.11	.07	-.03	.10	.17	.14	.57	.20	.16	.20	.04	.16	-					
18. T2 Gen Support	-.16	-.24	-.28	-.04	-.12	-.19	-.06	-.06	-.26	-.26	-.02	-.40	-.04	-.01	.06	-.34	-.03	-				
19. T2 Shoot Support	-.16	-.15	-.12	-.08	-.12	-.08	-.01	-.10	-.12	-.13	.03	-.26	-.04	-.02	.14	-.17	-.01	.36	-			
20. No PTSD *	-.32	-.29	-.25	-.19	-.22	-.06	-.03	-.08	-.27	-.21	-.10	-.49	-.56	-.28	-.22	-.44	-.13	.15	.19	-		
21. T2 PTSD *	.12	.12	.08	.11	.07	-.02	.06	.01	.11	.06	.07	.23	.37	.13	.15	.23	.04	-.03	-.06	-.79	-	
22. T2 and T3 PTSD *	.31	.26	.25	.12	.23	.13	-.04	.12	.25	.24	.05	.40	.29	.24	.11	.33	.12	-.18	-.20	-.34	-.31	-
<i>M</i>	9.89	1.92	1.05	1.24	2.42	1.28	-	-	2.48	2.13	2.56	2.20	2.74	2.40	2.82	2.59	.04	5.99	4.47	-	-	-
<i>SD</i>	11.06	.61	1.21	.83	2.05	.78	-	-	1.07	.59	2.23	.67	1.07	1.48	1.28	1.12	.81	1.0	.81	-	-	-
<i>Minimum</i>	0	1	0	0	0	1	0	0	1	1	0	1	1	0	1	1	-78	1.08	1	0	0	0
<i>Maximum</i>	55	4.20	3	4	10	6	1	1	6.29	4.06	8	4.75	5	9	6	6.14	2.66	7	5	1	1	1
<i>N</i>	534	573	573	573	573	564	568	529	571	569	505	573	572	573	569	573	499	569	568	573	573	573

Note. T1 PTSS = posttraumatic stress symptoms at time 1; T1 Gen Distress = Symptom Checklist - 10; T1 Emo Impair = activities impaired due to emotional problems; T1 Phys Impair = activities impaired due to physical problems; T1 CPA = childhood physical abuse; T1 CSA = childhood sexual abuse; T1 AdSA = adolescent sexual assault; T1 EA = experiential avoidance; T1 DER = difficulties with emotion regulation; T1 Hvy Drink = Heavy alcohol use; T2 ERSPPS = emotion regulation strategies post-shooting; T2 PDE = peritraumatic dissociative experiences; T2 Shoot Exp = exposure to the mass shooting; T2 PTG = posttraumatic growth; T2 Hvy Drink = Heavy alcohol use; T2 Gen Support = General social support; T2 Shoot Support = extent satisfied with social support available post-shooting;

* = dummy coded probable PTSD category compared to all other probable PTSD categories; Correlations in bold are significant at $p < .05$.

Table 2
Multinomial Logistic Regression Results with No Probable PTSD and PTSD at T2 Only as Referent Categories

	No PTSD vs. PTSD at T2					No PTSD vs. PTSD at T2 and T3					PTSD at T2 vs. PTSD at T2 and T3				
	B	SE	OR	95% CI	p	B	SE	OR	95% CI	p	B	SE	OR	95% CI	p
Pre-Shooting															
T1 PTSS	.46	.14	1.58	1.19–2.10	.001	.63	.18	1.87	1.31–2.68	.001	.17	.15	1.18	.88–1.59	.27
T1 Gen Distress	.30	.14	1.35	1.02–1.79	.03	.46	.20	1.58	1.06–2.35	.03	.16	.19	1.17	.81–1.68	.41
T1 Emo Impair	.13	.10	1.14	.94–1.37	.18	.37	.14	1.45	1.09–1.91	.01	.24	.14	1.27	.98–1.66	.07
T1 Prior Trauma	.06	.05	1.06	.96–1.18	.24	.20	.08	1.23	1.06–1.42	.01	.14	.07	1.15	1.01–1.32	.04
T1 EA	.16	.16	1.17	.86–1.58	.31	.07	.24	1.07	.68–1.71	.76	–.09	.22	.92	.60–1.42	.70
T1 DER	–.18	.14	.84	.64–1.11	.21	.08	.21	1.08	.71–1.65	.71	.26	.20	1.29	.87–1.92	.20
Post-Shooting															
T2 ERSFSP	.60	.19	1.82	1.25–2.64	.002	1.44	.28	4.23	2.42–7.38	<.001	.85	.24	2.33	1.47–3.69	<.001
T2 PDE	1.25	.15	3.49	2.61–4.67	<.001	1.51	.23	4.53	2.90–7.06	<.001	.26	.19	1.30	.90–1.88	.17
T2 Shooting Exp	.35	.10	1.41	1.17–1.70	<.001	.56	.13	1.75	1.36–2.25	<.001	.21	.10	1.24	1.02–1.49	.03
T2 PTG	.42	.12	1.52	1.19–1.94	.001	.63	.20	1.88	1.27–2.78	.002	.21	.17	1.24	.88–1.74	.22
T2 EA	.39	.18	1.48	1.04–2.10	.03	.45	.25	1.56	.95–2.57	.08	.06	.20	1.06	.71–1.58	.78
T2 Shoot Support	–.48	.13	.62	.47–.80	<.001	–.79	.18	.46	.32–.65	<.001	–.30	.14	.74	.57–.97	.03
Combined Model															
T1 PTSS	.41	.16	1.50	1.09–2.08	.01	.56	.22	1.75	1.14–2.69	.01	.15	.16	1.17	.85–1.61	.35
T1 General Distress	.07	.15	1.07	.79–1.44	.70	.22	.22	1.25	.82–1.90	.31	.15	.17	1.17	.83–1.64	.38
T1 Impaired Act	–.04	.12	.96	.77–1.21	.73	.19	.17	1.21	.87–1.70	.27	.23	.14	1.26	.95–1.66	.10
T1 Prior Trauma	.01	.07	1.01	.88–1.52	.94	.15	.10	1.17	.96–1.41	.12	.15	.08	1.16	1.0–1.35	.06
T2 ERSFSP	.63	.20	1.87	1.27–2.74	.001	1.44	.29	4.21	2.38–7.47	<.001	.81	.24	2.25	1.41–3.61	.001
T2 PDE	1.25	.15	3.50	2.60–4.70	<.001	1.50	.23	4.47	2.84–7.06	<.001	.25	.19	1.28	.88–1.87	.20
T2 Shooting Exp	.35	.10	1.42	1.17–1.71	<.001	.62	.14	1.85	1.42–2.41	<.001	.27	.10	1.31	1.07–1.60	.01
T2 PTG	.42	.13	1.52	1.18–1.88	.001	.60	.21	1.83	1.21–2.75	.004	.18	.18	1.20	.85–1.71	.31
T2 EA	.27	.19	1.30	.89–1.90	.17	.03	.28	1.03	.60–1.79	.91	–.23	.23	.79	.51–1.24	.21
T2 Shoot Support	–.46	.14	.63	.48–.83	.001	–.73	.19	.48	.34–.70	<.001	–.26	.14	.77	.58–1.02	.07

Note. $N = 573$; T1 PTSS = posttraumatic stress symptoms; T1 Gen Distress = Symptom Checklist - 10; T1 Emo Impair = role limitation due to emotional problems; T1 EA = experiential avoidance; T1 DER = difficulties with emotion regulation; T2 ERSPTS = emotion regulation strategies post-shooting; T2 PDE = peritraumatic dissociative experiences; T2 Shooting Exposure = exposure to the mass shooting; T2 PTG = posttraumatic growth; T2 EA = experiential avoidance; T2 Shoot Support = extent satisfied with social support available post-shooting.