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Prior Sexual Trauma and Adjustment Following the Virginia Tech Campus Shootings: Examination of the Mediating Role of Schemas

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Abstract

A sizable body of research supports trauma's cumulative nature. However, few studies have evaluated potential mechanisms through which the experience of multiple traumas leads to elevated distress. The current study sought to evaluate differences between sexual trauma victims and women who had not experienced sexual trauma in their adjustment following a mass trauma (college women exposed to the 2007 Virginia Tech campus shooting). In addition, the study examined whether maladaptive schema change (lower self-worth and less belief in benevolence) and social support mediated the relationship between experiencing multiple traumas (sexual trauma and the campus shooting) and distress. The sample consisted of 215 college women who were assessed preshooting as well as two months and one year following the campus shooting. Women who had experienced sexual trauma (either contact sexual abuse or sexual assault) were compared to those who had not on their one-year postshooting PTSD and depressive symptoms. Results supported that sexual trauma victims reported significantly more depressive symptoms and shooting-related PTSD as well as less belief in benevolence and lower family support. Family support and benevolence beliefs at the two month postshooting assessment were significant mediators of the association between sexual trauma history and depression and PTSD. Implications of the findings for future research evaluating the cumulative impact of multiple traumatic experiences are discussed.

Keywords

multiple traumas; world assumptions; schemas; social support

The impact of traumatic experiences on individuals' psychological health appears to be cumulative. Those who have experienced multiple traumas are more likely to develop posttraumatic stress disorder (PTSD) than those who have had a single traumatic experience, and there appears to be a linear relationship between the number of traumas experienced and an individual's risk for PTSD (Cogle, Resnick, & Kilpatrick, 2009; Fritch, Mishkind, Reger, & Gahm, 2010; Kimerling, Alvarez, Pavao, Kaminski, & Baumrind, 2007; Mollica, McInnes, Poole, & Tor, 1998; Nishith, Mechanic, & Resick, 2000; Suliman et al., 2009). Experiencing multiple traumas has also been associated with a greater risk of depression

than experiencing a single traumatic event (Fritch et al., 2010; Kimerling et al., 2007; Krupnick et al., 2004; Mollica et al., 1998; Suliman et al., 2009; Tanskanen et al., 2004). However, the majority of research on the cumulative nature of trauma has been cross-sectional (see Cogle et al. [2009] for an exception). Thus, it cannot be definitively determined whether experiencing multiple traumas increases distress or, alternatively, whether distressed trauma victims are more vulnerable to experiencing subsequent trauma. It is also possible that distressed individuals may be more likely than nondistressed individuals to recall prior trauma experiences.

In addition, very little research has focused on identifying mechanisms through which prior trauma may increase vulnerability to experiencing significant and persistent distress following subsequent trauma. One hypothesis is that sensitization occurs, whereby prior trauma exposure sensitizes individuals to respond more intensely to subsequent traumas (Cogle et al., 2009). Another possibility is that individuals' current symptoms represent an accumulation of symptoms associated with all prior traumatic events, as opposed to one index trauma (Krupnick et al., 2004). Although these models are clearly important in explaining the cumulative impact of trauma, they appear inadequate in fully explaining this phenomenon. For example, researchers have found certain types of trauma to be more detrimental to psychological well-being than others. Specifically, interpersonal traumas are more strongly associated with distress than traumas that do not involve a perpetrator. Interpersonal traumas also have a clearer cumulative impact than traumas not involving a perpetrator (Gustafsson, Nisson, & Svedin, 2009; Krupnick et al., 2004). However, the sensitization model does not specify a mechanism through which certain types of traumas lead to a stronger sensitization response than others. In addition, Cogle and colleagues (2009) found that, inconsistent with a symptom accumulation model, having a history of PTSD did not predict subsequent development of PTSD symptoms following new trauma exposure over a seven year follow-up period, although it should be noted that the possibility that this finding reflects a lack of power to detect such an effect cannot be ruled out (Cogle et al., 2009). Other than this study, no other extant longitudinal research has evaluated the symptom accumulation model. Thus, the symptom accumulation and sensitization models are underresearched, and extant research suggests that they are likely inadequate in fully explaining the cumulative nature of trauma. It is therefore likely that other factors are playing a role in trauma's cumulative impact.

Some researchers have sought to specify additional posttrauma processes that may explain why multiple traumas, particularly interpersonal traumas, increase individuals' vulnerability to significant and persistent distress. One process that may explain the cumulative impact of trauma is the effect of multiple traumas on individuals' schemas regarding themselves, the world, and others. It has been theorized that trauma experiences, particularly interpersonal traumas, are distressing in part because they represent a threat to individuals' views of themselves and the world (Cason, Resick, & Weaver, 2002), such as beliefs that people and the world are benevolent, that the self has value, and that the world is just. Although individuals will attempt to maintain positive schemas in the face of trauma, this may not be possible following interpersonal trauma, particularly following multiple interpersonal traumas. Instead, victims alter their schemas about themselves and the world, often in maladaptive and extreme ways (e.g., believing that no one can be trusted, believing that the self has no worth; Resick & Schnicke, 1992). Experiencing additional traumas could also serve to confirm and further alter individuals' maladaptive schemas (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). Supporting the importance of changes in these schemas in explaining posttrauma adjustment, researchers have found victims with PTSD to hold more negative schematic beliefs than individuals without PTSD (e.g., Ali, Dumore, Clark, & Ehlers, 2002; Foa et al., 1999; Ginzburg, 2004). In addition, supporting the possibility that multiple traumas may represent a particular challenge to individuals' schemas, a longitudinal

study by Rini and colleagues (2004) of mothers whose children were undergoing bone marrow transplants found that mothers with prior trauma histories had lower self-worth. Self-worth was then associated with adjustment following the child's treatment.

An additional process proposed to partially explain the cumulative impact of trauma is the effect of these experiences on social support. A substantial body of literature supports that a lack of social support is associated with posttrauma distress (see Guay, Billette, & Marchand, 2006 for a review). There are a number of reasons why social support may be important in posttrauma adjustment. For example, individuals' support networks may play a key role in promoting adaptive trauma coping through such means as modeling adaptive coping, providing material and emotional support, and challenging maladaptive coping (Flannery, 1990; Littleton, 2010). In addition, having a strong support network may serve to enhance individuals' sense of worth and to promote well-being as a result of receiving care and acceptance (Cohen & Wills, 1985; Flannery, 1990; Littleton, 2010).

However, experiencing multiple traumas may wear away individuals' social support. This could occur because individuals may withdraw from others following multiple trauma experiences; at the same time, the continued distress that victims experience could lead others to withdraw from them (Guay et al., 2006). In addition, trauma experiences may impair individuals' ability to obtain and retain supportive relationships (King, King, Taft, Hammond, & Stone, 2006). For example, perceptions of low worth combined with prior abuse may increase the likelihood that an individual continues relationships that are nonsupportive or abusive. Difficulties trusting others and negative perceptions of others' intentions as a result of multiple traumas could also lead individuals to avoid relationships, end relationships following perceived betrayals, and engage in poor social problem-solving behavior. Supporting the notion that the experience of multiple traumas may negatively affect individuals' social support, Banou, Hobfoll, and Trochelman (2009) found in a sample of women with cancer that those with a history of interpersonal trauma reported more loss of interpersonal resources (e.g., loyalty and support from friends or one's partner) than did women without prior interpersonal trauma, and that interpersonal resource loss mediated the relationship between prior trauma and PTSD symptoms and depression.

Thus, overall, maladaptive schema changes and lack or loss of social support appear to be potentially important factors in explaining trauma's cumulative impact. The current study therefore examined maladaptive schema changes and social support in a sample of college women who were exposed to the Virginia Polytechnic Institute and State University (Virginia Tech) campus shooting and who were assessed preshooting, two months postshooting, and one year postshooting. This shooting occurred on April 16, 2007 and involved a lone gunman. The shooting was the most deadly civilian shooting in U.S. history, with a total of 33 individuals (including the gunman) killed and an additional 25 wounded (Associated Press, 2007). We first examined whether women with a sexual trauma history (sexual abuse or assault) reported significantly worse adjustment (in the form of PTSD or depressive symptoms) following the shooting than those without such a history. We also evaluated whether women who were sexual trauma victims reported more maladaptive schemas (low self-worth and less belief in benevolence) and lower social support postshooting than did women who had not experienced sexual trauma. Finally, we evaluated whether benevolence beliefs, self-worth, and social support mediated the relationship between sexual trauma history and postshooting adjustment. The current study is one of the first to evaluate these potential mechanisms, which may explain in part the cumulative nature of trauma. In addition, the current study is one of only a few to evaluate the association between adjustment and multiple traumas using a longitudinal methodology.

Method

Participants

Participants were 215 women who were enrolled as students at Virginia Tech drawn from a sample of women who completed an online study of sexual victimization ($n = 843$) prior to the campus shooting (data collected Fall 2006 and Spring 2007 semesters). Participants in the current study were those who completed online surveys about their postshooting adjustment two months and one year postshooting (drawn from $n = 363$ women who completed at least one of three postshooting surveys). A total of 86% of participants self-identified as European American, 5.6% as Asian American, 2.3% as African American, and 1.9% as Latina. The remaining 5% of participants self-identified as multiethnic, other ethnicities, or did not indicate their ethnicity.¹ Participants were 19.5 years of age on average ($SD = 1.4$, range 18–27 years) when they completed the initial survey. A total of 34.9% ($n = 75$) of participants reported having experienced sexual victimization.

Prior analyses using this dataset supported that there were few differences between women who completed the initial two-month postshooting survey and those who did not (Littleton, Grills-Taquechel, & Axsom, 2009). Specifically, women who completed the two-month postshooting survey were slightly older, $t(831) = 3.16$, $p < .005$, $d = .23$, and reported slightly less social support, $t(840) = 3.09$, $p < .005$, $d = .22$, than women who did not complete it. There were no significant differences between women who completed both the two-month and one-year postshooting surveys ($n = 215$) and those who did not ($n = 148$).

Measures

Preshooting survey—Measures to assess the following experiences were administered at the preshooting survey only.

Sexual abuse history: Three behaviorally specific items assessed experiences of sexual abuse in childhood (before age 14). These items were drawn from a previously developed measure (Williams, Siegel, & Pomeroy, 2000) and assessed unwanted sexual experiences, including sexual contact with relatives (e.g., parents, grandparents, stepparents, siblings, aunts, uncles) and individuals in caretaking roles or positions of authority (e.g., teachers, ministers, babysitters).

Sexual assault history: Two behaviorally specific screening items from the Sexual Experiences Survey (SES; Koss & Gidycz, 1985) assessed experiences of rape or sexual assault since the age of 14. The items assessed experiences of unwanted sex (oral sex, vaginal or anal intercourse, or object penetration) with a man or men that was obtained by threat or force, or that occurred when the victim was incapacitated or unconscious, such as from alcohol or drugs.

Two months postshooting—A measure to assess experience with the following was administered at the two-month postshooting survey only.

Exposure to the shooting incident: Participants were asked a series of yes/no questions regarding their amount of exposure to several aspects of the shooting (e.g., in one of the buildings where the shooting occurred, saw the gunman). Participants were placed into one of three exposure groups: no direct exposure, moderate direct exposure (was on campus, saw

¹According to the Virginia Tech on-campus enrollment profile, among undergraduates enrolled during the 2006-2007 academic year who indicated their ethnicity, 82% self-identified as European American, 7.9% as Asian American, 5% as Black or African American, and 2.6% as Latina/o (http://www.vt.edu/about/factbook/student_overview.php).

police or security), and severe direct exposure (was in one of the buildings where the shootings occurred, heard gunfire, saw individuals who had been wounded or killed). No participants reported that they were fired upon or saw the gunman fire on anyone else.

Two-month and one-year postshooting—Measures to assess the following experiences and perceptions were administered at both postshooting surveys.

Shooting-related PTSD symptoms: The PTSD Symptom Scale Self-Report (PSS-SR; Foa, Riggs, Dancu, & Rothbaum, 1993) was administered to assess shooting-related PTSD. The PSS-SR is a 17-item measure designed to assess posttraumatic stress symptoms with items mapping on to the diagnostic criteria for PTSD. A sample item is, “Reliving the event, acting or feeling as if it was happening again.” For each item, individuals rated how often they had the described symptom in the past week in connection to the shooting on a 4-point Likert-type scale anchored by 0 (not at all or only one time) and 3 (five or more times per week/almost always). Scores can range from 0 to 51, and scores of 14 or above indicate likely PTSD diagnostic status (Coffey, Gudmundsdottir, Beck, Palyo, & Miller, 2006). Prior research supports the internal consistency ($\alpha = .91$), test-retest reliability ($r = .74$), as well as sensitivity (62%) and specificity (100%) of the measure (Foa et al., 1993). Cronbach's alpha across assessments in the current study ranged from .90 to .92.

Trauma-related schemas: To assess adherence to negative trauma-related schemas, the World Assumptions Scale was administered (WAS; Janoff-Bulman, 1989). For each item, individuals rated the extent to which they agreed with the statement on a 6-point Likert-type scale bounded by 1 (*strongly disagree*) and 6 (*strongly agree*). A sample item is, “People are naturally unfriendly and unkind.” The current study focused on three four-item WAS subscales: benevolence of people, benevolence of the world, and self-worth. These subscales have been found to have the strongest internal consistency ($\alpha_s = .71-.88$) and test-retest reliabilities ($r_s = .57-.65$; Kaler et al., 2008; Littleton & Radecki Breitkopf, 2006). Because research supports that the benevolence of people and benevolence of the world subscales load on the same factor (Kaler et al., 2008; Littleton & Radecki Breitkopf, 2006), these subscales were combined into a benevolence beliefs sub-scale. Cronbach's alpha of the benevolence beliefs subscale across assessments ranged from .80 to .89 and of the self-worth subscale ranged from .82 to .84.

All assessment times—Measures to assess the following experiences and perceptions were administered at all assessments.

Depressive symptoms: The Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977) was administered to assess depressive symptoms. It is a 20-item, self-report measure of primarily the affective component of depressive symptomatology. For each item, individuals indicated how often they have felt that way in the past week on a 4-point Likert-type scale bounded by 0 (*rarely or none of the time/less than one day*) and 3 (*most or all of the time/5–7 days*). A sample item is, “I felt depressed.” Prior research supports the measure's internal consistency ($\alpha_s = .85-.90$), test-retest reliability ($r_s = .51-.67$), and validity (correlations with other interview and self-report depression measures, $r_s = .49-.90$; Radloff, 1977; Roberts, 1980; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Cronbach's alpha in the current sample across assessments ranged from .91 to .92.

Social support: The Multidimensional Scale of Perceived Social Support was administered to assess social support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS is a 12-item measure of perceived social support with scales assessing social support from family (my family is willing to help me make decisions), friends (I can talk about my

problems with my friends), and a significant other (there is a special person in my life). For each item, individuals indicated the extent to which they agreed with the statement on a 7-point Likert-type scale bounded by 1 (*very strongly disagree*) and 7 (*very strongly agree*). Prior research supports the measure's internal consistency ($r_s = .85-.91$) and factor structure (Zimet et al., 1988). Cronbach's alpha of the scales in the current sample across assessments ranged from .93 to .97.

Procedures

Prior to the shooting, participants received course credit to take part in a multiuniversity online survey of negative sexual experiences and psychological health, open to all women 18 years of age and older. They completed this survey prior to the shooting, either during the same semester as the campus shooting (Spring, 2007) or during the previous semester (Fall, 2006). Relevant to the current investigation, participants completed measures regarding history of sexual abuse and sexual assault, current depressive symptoms, and perceived social support. E-mail addresses were collected to award credit.

Two months after the shooting, all Virginia Tech women who completed the initial survey were sent an e-mail inviting them to participate in an online survey related to risk and resilience following the shooting. Potential participants were informed that their postshooting survey responses would be linked to their prior survey responses and were given a unique id and password (to link their postshooting responses to their preshooting survey responses) to log-in and complete the survey. The postshooting survey assessed shooting exposure, world assumptions, posttrauma symptoms, social support, psychological distress, and other shooting-related variables. Participants had four weeks to complete the survey and were sent up to five electronic reminders (once participants completed the survey, they were not sent more reminders). Participants were informed they could opt out of receiving information about the postshooting surveys by sending an e-mail to the study investigators (only 4 individuals did so). Participants were compensated with their choice of either a \$20 gift certificate or a donation to a Virginia Tech shooting victim memorial fund.

One year after the shooting participants, were sent an e-mail message asking them to complete a similar survey. Participants were again compensated with a \$20 gift certificate (the memorial fund had closed), and five women received a \$50 gift certificate in a drawing. All surveys were approved by the university institutional review board and the postshooting surveys were approved by a university committee developed to ensure ethical conduct in shooting-related research.

Analysis Plan

To conduct the mediation analyses, study investigators used the bootstrap procedure recommended by Preacher and Hayes (2004) and Shrout and Bolger (2002). Bootstrapping entails creating a large number of bootstrap (pseudo) samples of randomly sampled observations from the data set that are drawn with replacement. Researchers then estimate the model paths for each of these bootstrap samples (Shrout & Bolger, 2002). They then use the results from the bootstrap analyses to construct estimates for the model paths and a confidence interval of these estimates. If the confidence interval does not contain 0, this supports a significant model path (Preacher & Hayes, 2004; Shrout & Bolger, 2002). Specifically, this procedure allows one to generate an estimate and confidence interval for the path from the predictor variable to the mediator (the a path), the path from the mediator to the outcome (the b path), and the path from the predictor to the outcome after controlling for the mediator (the c' path). Finally, this procedure allows one to generate an estimate and confidence interval for the overall mediated path (the $a \times b$ path), and thus evaluate the overall significance of the mediated model. Study investigators chose this procedure to

evaluate mediation based on evidence that traditional tests of mediation have lower power, particularly in smaller samples or if the mediated effect is small (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2004; Shrout & Bolger, 2002).

The bootstrap analyses were conducted using the MPlus program (version 5.1; Muthén & Muthén, 1998–2007). A total of 1,000 draws were used for all bootstrap analyses, the minimum number necessary for estimating the upper and lower bounds of the 95% confidence intervals (Edwards & Lambert, 2007; Preacher & Hayes, 2008). Bias-corrected bootstrap values were estimated, which adjust for differences between the product from the full sample and the median of the products estimated from the bootstrap sample (Edwards & Lambert, 2007). Finally, unstandardized estimates were reported because standardized estimates are not interpretable in the analyses under consideration (A. F. Hayes, personal communication, December 8, 2010). For the mediation analyses, whether participants had a sexual violence history (coded as endorsing an experience of childhood sexual abuse and/or adolescent/adult sexual assault) was the predictor variable, participants' score on the social support or world assumptions scale at the two-month postshooting survey was the mediator and their total score on the symptom measure (either PTSD or depression) at the one-year postshooting survey was the outcome variable.

Results

Differences Between Sexual Violence Victims and Non-Victims on Study Variables

Sexual victimization was common in the sample with a total of 34.9% ($n = 75$) of participants reporting this experience. A total of 18.6% ($n = 40$) had experienced sexual assault as an adolescent or adult and 24.7% ($n = 53$) had experienced sexual abuse as a child. Notably, 8.4% ($n = 18$) of participants (24% of victims) had experienced *both* sexual abuse and sexual assault. Bonferroni-adjusted ANOVAs supported that there were no significant differences among these three victim groups (sexual abuse victims, sexual assault victims, and those reporting both sexual abuse and sexual assault) on any study variables.

Nearly all participants reported some direct exposure to the shooting, with 41.9% ($n = 90$) reporting moderate direct exposure and 32.6% ($n = 70$) reporting severe direct exposure. There were no differences between sexual violence victims and nonvictims in the proportion reporting moderate or severe direct shooting exposure. Participants' scores on all study measures stratified by sexual victimization status are summarized in Table 1. Missing data was minimal, with all variables having less than 1% missing. The t tests that examined differences in depression and social support pre-shooting between victims of sexual violence and nonvictims supported the idea that victims reported significantly less family support than nonvictims, $t(213) = 2.87, p = .004, d = .41$. There were no other significant differences between sexual violence victims and nonvictims at preshooting. At two-months postshooting, as hypothesized, victims reported less benevolence beliefs, $t(213) = 2.85, p = .005, d = .41$, and family support, $t(212) = 2.33, p = .02, d = .34$, than did nonvictims. In the examination of differences between victims and nonvictims on their one-year postshooting adjustment, as hypothesized, victims reported significantly more depressive, $t(213) = 2.76, p = .006, d = .40$, and PTSD symptoms, $t(212) = 2.10, p = .04, d = .30$, than did nonvictims. In addition, as hypothesized, victims reported less benevolence beliefs, $t(212) = 3.56, p < .001, d = .51$, self-worth, $t(213) = 2.84, p = .005, d = .41$, and family support, $t(213) = 2.47, p = .014, d = .35$, than nonvictims did. There were no differences between victims and nonvictims in their friendship or significant other support one-year postshooting.

Mediation Analyses

Table 2 summarizes correlations among observed variables. Bootstrap analyses supported that the path from a history of sexual violence to the potential mediators was significant for two of the potential mediators: two-month postshooting benevolence beliefs and family support. Thus, these two variables were evaluated as potential mediators of the relationship between sexual victimization history and one-year postshooting adjustment (PTSD and depressive symptomatology). Table 3 summarizes bootstrap estimates and confidence intervals for these four mediation analyses. The overall mediated path (the $a \times b$ path) for both two-month postshooting benevolence beliefs and family support was statistically significant in the models predicting one-year postshooting depressive symptoms, supporting significant mediation. Also, in both cases, the path from sexual victimization history to postshooting depression after accounting for the effect of the mediator (the c' path) was statistically significant, suggesting that both benevolence beliefs and family support were partial mediators of the association between sexual victimization and depressive symptoms.

Similarly, for the two models examining one-year postshooting PTSD symptomatology, the overall mediated path ($a \times b$ path) for family support and benevolence beliefs were statistically significant, supporting the presence of significant mediation. The path from sexual victimization to PTSD after accounting for the effect of the mediator (the c' path) was not significant in either case, suggesting full mediation.²

Discussion

Results supported the cumulative nature of trauma experiences. Although victims of sexual trauma and nonvictims of sexual trauma reported similar levels of distress prior to the campus shooting and in the immediate shooting aftermath, sexual trauma victims had significantly poorer adjustment one year following the shooting, reporting elevated depressive and PTSD symptoms. Indeed, the depressive symptoms of sexual trauma victims actually increased over time, whereas those of nonvictims decreased (reflecting a significant Time \times Sexual Trauma Victim Status interaction). Thus, women with sexual trauma histories appeared particularly vulnerable to long-term distress following a mass trauma that affected their whole campus community. In addition, results suggested that it was the experience of multiple traumas that enhanced their vulnerability to elevated distress following the shooting, rather than an accumulation of symptoms from multiple traumas, as sexual trauma victims were not more distressed than nonvictims prior to the shooting (with regard to depression) or in the initial postshooting adjustment period (with regard to both depression and PTSD).

Results also supported the role of schemas as a mediator of the relationship between prior trauma and adjustment. Specifically, similar to the findings of Rini and colleagues (2004), women with prior sexual trauma histories reported less benevolence beliefs in the aftermath of the campus shooting. Benevolence beliefs also prospectively and significantly mediated the relationship between sexual trauma history and distress, particularly in the case of depression. This supports the notion that multiple trauma experiences may wear away individuals' beliefs in the extent to which others and the world are good. Loss of belief in benevolence may then increase individuals' vulnerability to persistent distress. This could occur because individuals who view others as hostile and unhelpful may be less likely to

²All mediation analyses were re-run with preshooting depression, preshooting family support, and level of exposure to the shooting included in the model as predictors of one-year postshooting depression and PTSD. Of these variables, severe exposure and preshooting depression significantly predicted postshooting depression, and severe exposure significantly predicted PTSD. Whereas the general pattern of findings was similar in the models including these variables, the mediated path remained significant for the depression models but not the PTSD models.

seek out help from others in coping with their distress. Additionally, individuals who view the world and others as less benevolent may be more likely to engage in negative attributions regarding others' intentions and behaviors, increasing symptoms.

In addition, family support emerged as a significant prospective mediator of the relationship between sexual trauma history and postshooting adjustment, with sexual trauma victims reporting less family support than nonvictims. Notably, sexual trauma victims reported less family support than nonvictims both pre and postshooting (only postshooting support was examined as a mediator). This in part could reflect greater levels of family dysfunction among victims of sexual violence, particularly those abused by family members (Long & Jackson, 1994; Messman-Moore & Brown, 2004; Ray, Jackson, & Townsley, 1991). Additionally, sexual violence victims may be less likely to seek support from family members due to feelings of distress and changes in schemas as a result of experiencing sexual violence. It is also possible that sexual violence victims may have been more likely to have had negative interactions with family members when they sought assistance following the shooting. Family support in particular may be important in adjustment among college women, since, developmentally, college students are still transitioning into the adult role and may still be at least partially dependent on their parents or guardians. Also, because the entire campus community was affected by the shooting, having social support from individuals not directly affected may be especially important. Indeed, qualitative data collected supported that the majority of participants, 77%, left town after the shooting incident (likely returning to their parents' or other relatives' homes) when the campus was closed for several days.

In contrast, there were no postshooting differences between sexual violence victims and nonvictims in their belief in their own worth or in their friend or significant other support. In part, the lack of differences on these variables could reflect the fact that because the current study involved a college sample, it is likely that women who experienced the most severe adjustment difficulties following sexual violence were underrepresented because they may not have enrolled in college or may have dropped out. With regard to social support specifically, the outpouring of emotional support, professional assistance, and the many public mourning activities following the shooting could have protected individuals from experiencing the deterioration in support that can occur following mass trauma (Kaniasty & Norris, 1993). It is also important to note that the sexual trauma victims in the current sample greatly varied on a number of trauma characteristics including the chronicity of their experiences, the amount of time that had passed since the victimization, and the number of victimizations experienced. The heterogeneity in the trauma experiences of women combined with the fairly small sample size could have served to obscure differences between victims and nonvictims on these constructs. Finally, it also should be noted that although sexual trauma victims did not differ from nonvictims in their perceptions of their own worth at the two-month postshooting assessment, they did report significantly lower self-worth than nonvictims at the one-year postshooting assessment. This suggests the possibility that multiple trauma victims may be less able to respond adaptively to the challenge to their own worth presented by a new traumatic experience, perhaps in part because they are more likely than single trauma victims to experience persistent distress.

Limitations of the current study should be noted. First, the response rates to the online survey invitations were low, but not significantly different than found in prior Web surveys (Cook, Heath, & Thompson, 2000). There were also few differences between women who participated in the current study and those who did not. It should also be noted that the sample did not include those individuals most severely exposed to the shooting (e.g., individuals who were fired upon). In addition, only preshooting sexual trauma was assessed as opposed to comprehensively assessing prior trauma history. However, previous research

supports that sexual trauma in particular is likely to have a negative impact on individuals' functioning (Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Perkonig, Kessler, & Wittche, 2000). Sexual trauma was also common. Additionally, some measures, including benevolence beliefs and PTSD were not administered, prior to the shooting; thus, it is not known whether sexual trauma victims differed from nonvictims on these constructs prior to the shooting. As a result, we could not definitely determine whether the experience of multiple traumas led to more maladaptive schema change (the idea of schematic beliefs being worn away by multiple challenges to these beliefs) or whether multiple trauma victims held more maladaptive beliefs prior to the shooting (the shooting served to confirm their extant maladaptive beliefs), and thus represented a group that was more vulnerable to experiencing persistent distress. Additionally, we could not evaluate the extent to which postshooting PTSD among multiple trauma victims represented an accumulation of PTSD symptoms due to multiple traumas. Finally, only self-report measures were administered and were not supplemented with clinical interviews.

Bearing these limitations in mind, results have implications for future research focused on understanding the cumulative nature of trauma. Most importantly, results suggest some potential mechanisms through which the experience of multiple traumas leads to psychological distress. Thus, future research should continue to evaluate the extent to which maladaptive schematic beliefs and social support mediate the relationship between multiple traumas and adjustment problems. Results also suggest that there may be different mediators of the relationship between multiple traumas and various adjustment outcomes, given that the findings for the mediated models were stronger in the case of postshooting depression than PTSD. Thus, future work should examine whether there are different mechanisms for the association between multiple trauma experiences and various adjustment outcomes. Future work also should focus on disentangling the extent to which trauma victims already are experiencing poor adjustment prior to experiencing additional traumas, as opposed to the experience of additional traumas leading to worse adjustment. In addition, future work should evaluate the relationships among social support and trauma-related schemas and their relationship with posttrauma adjustment. Work in these areas will lead to a fuller understanding of the cumulative nature of trauma and ultimately the development of more effective screening and intervention programs for trauma victims, including victims of mass traumas.

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Table 1
Participants' Scores on Study Measures Stratified by Sexual Victim Status

	Preshooting				2 months postshooting				1 year postshooting			
	Victims		Non-victims		Victims		Non-victims		Victims		Non-victims	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
CES-D	14.71	10.26	14.31	9.48	16.37	10.17	13.72	9.51	17.80 ^a	10.01	13.80 ^a	10.20
PSS-SR	—	—	—	—	12.51	9.51	10.75	8.50	12.31 ^a	10.46	9.45 ^a	8.95
WAS (benevolence)	—	—	—	—	32.68 ^a	6.95	35.22 ^a	5.81	31.71 ^b	6.22	34.94 ^b	6.41
WAS (self-worth)	—	—	—	—	13.55	3.58	14.26	2.80	17.56 ^a	4.10	19.11 ^a	3.64
MSPSS (family)	19.96 ^a	7.44	22.54 ^a	5.54	21.49 ^b	6.29	23.37 ^b	5.20	21.53 ^c	6.03	23.47 ^c	5.17
MSPSS (friends)	22.15	5.61	23.34	5.75	22.33	5.49	23.61	5.13	22.41	4.74	23.34	5.43
MSPSS (significant other)	22.92	6.71	22.12	6.50	22.99	7.12	23.34	5.61	23.13	6.14	23.18	6.33

Note. Shared superscripts denote significant mean differences ($p < .05$) between victims and non-victims. CES-D = Center for Epidemiologic Studies, Depression Scale; PSS-SR = Posttraumatic Stress Disorder (PTSD) Symptom Scale, Self-Report; WAS = World Assumptions Scale; MSPSS = Multidimensional Scale of Perceived Social Support.

Table 2

Correlations Among Observed Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1. CES-D, pre-shooting	—																	
2. MSPSS (family), pre-shooting	-.34	—																
3. MSPSS (friends), pre-shooting	-.30	.51	—															
4. MSPSS (significant other), pre-shooting	-.22	.39	.38	—														
5. CES-D, 2 months postshooting	.46	-.30	-.28	-.16	—													
6. PSS-SR, 2 months postshooting	.28	-.15	-.10	-.09	.56	—												
7. WAS (benevolence), 2 months postshooting	-.25	.25	.22	.23	-.48	-.16	—											
8. WAS (self-worth), 2 months postshooting	-.40	.29	.29	.14	-.59	-.23	.44	—										
9. MSPSS (family), 2 months postshooting	-.20	.59	.20	.17	-.41	-.19	.31	.31	—									
10. MSPSS (friends), 2 months postshooting	-.18	.34	.41	.10	-.48	-.27	.37	.35	.58	—								
11. MSPSS (significant other), 2 months postshooting	-.22	.43	.53	.41	-.33	-.10	.30	.27	.27	.53	—							
12. CES-D, 1 year postshooting	.44	-.27	-.23	-.17	.54	.47	-.29	-.45	-.26	-.26	-.15	—						
13. PSS-SR, 1 year postshooting	.34	-.15	-.23	-.10	.49	.70	-.15	-.32	-.18	-.24	-.06	.66	—					
14. WAS (benevolence), 1 year postshooting	-.23	-.15	-.09	.12	-.36	-.21	.63	.31	.23	.31	.21	-.39	-.24	—				
15. WAS (self-worth), 1 year postshooting	-.37	.30	.22	.19	-.45	-.28	.29	.65	.30	.28	.22	-.67	-.41	.36	—			
16. MSPSS (family), 1 year postshooting	-.27	.62	.24	.26	-.44	-.25	.20	.32	.61	.38	.29	-.45	-.30	.26	.44	—		
17. MSPSS (friends), 1 year postshooting	-.23	.28	.39	.19	-.41	-.27	.21	.25	.28	.46	.24	-.48	-.27	.29	.35	.56	—	
18. MSPSS (significant other), 1 year postshooting	-.21	.33	.23	.53	-.35	-.17	.30	.30	.29	.24	.59	-.35	-.19	.21	.32	.50	.50	—

Note. CES-D = Center for Epidemiologic Studies, Depression Scale; PSS-SR = Posttraumatic Stress Disorder (PTSD) Symptom Scale, Self-Report; WAS = World Assumptions Scale; MSPSS = Multidimensional Scale of Perceived Social Support.

Table 3
Bias-Corrected Bootstrap Estimates and 95% Confidence Intervals of the
Unstandardized estimates for Mediation Analyses Predicting One-Year Postshooting
Adjustment

	Estimate	95% confidence interval of estimate
Sexual victimization/2-month benevolence/1-year depression		
<i>a</i>	-2.54	-4.36, -0.67
<i>b</i>	-0.43	-0.62, -0.23
<i>c'</i>	2.90	0.03, 5.70
<i>a × b</i>	1.10	0.34, 2.21
Sexual victimization/2-month family support/1-year depression		
<i>a</i>	-1.87	-3.46, -0.26
<i>b</i>	-0.44	-0.68, -0.20
<i>c'</i>	3.19	0.36, 5.98
<i>a × b</i>	0.81	0.17, 1.78
Sexual victimization/2-month benevolence/1-year PTSD		
<i>a</i>	-2.54	-4.36, -0.67
<i>b</i>	-0.20	-0.37, 0.01
<i>c'</i>	2.36	-0.49, 5.27
<i>a × b</i>	0.50	0.06, 1.36
Sexual victimization/2-month family support/1-year PTSD		
<i>A</i>	-1.88	-3.46, -0.28
<i>B</i>	-0.27	-0.49, -0.05
<i>c'</i>	2.35	-0.58, 5.06
<i>a × b</i>	0.51	0.07, 1.36

Note. *a* = path from predictor variable to mediator, *b* = path from mediator to outcome, *c'* = path from predictor to outcome after controlling for mediator, *a × b* = overall mediated path. Confidence interval ranges in bold are statistically significant. PTSD = Posttraumatic stress disorder.