

## Adjustment Following the Mass Shooting at Virginia Tech: The Roles of Resource Loss and Gain

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Unfortunately, many individuals will be exposed to traumatic events during their lifetime. The experience of loss and gain of valued resources may represent important predictors of psychological distress following these experiences. The current study examined the extent to which loss and gain of interpersonal and intrapersonal resources (e.g., hope, intimacy) predicted psychological distress among college women following the mass shooting at Virginia Tech (VT). Participants were 193 college women from whom preevent psychological distress and social support data had been obtained. These women completed surveys regarding their psychological distress, coping, and resource loss and gain 2- and 6-months after the VT shooting. Structural equation modeling supported that resource loss predicted greater psychological distress 6 months after the shooting whereas resource gain was weakly related to lower levels of psychological distress. The study also revealed that social support and psychological distress prior to the shooting predicted resource loss, and social support and active coping with the shooting predicted resource gain. Implications of the results for research examining the roles of resource loss and gain in posttrauma adjustment and the development of interventions following mass trauma are discussed.

*Keywords:* mass trauma, conservation of resources theory, campus violence, structural equation modeling

Unfortunately, many individuals will experience at least one traumatic event during their lifetime. Many of these traumas represent largely private experiences, such as abuse or assault. However, other traumas, such as natural disasters and terrorist attacks, leave whole communities affected in their wake. Losses and gains of valued resources following traumatic events may play key roles in adjustment and recovery following these experiences. Indeed,

a sizable body of recent empirical research has focused on these processes and how they may relate to adjustment following traumatic events.

Conservation of resources theory (COR theory; Hobfoll & Lilly, 1993) focuses on the role of *changes* in resources in predicting adjustment following trauma. COR theory defines resources as “objects, personal characteristics, conditions, or energies that are valued in their own right, or that are valued because they act as conduits to the achievement or protection of valued resources” (Hobfoll, 2001, p. 339). Thus, resources include tangible items (e.g., material possessions such as one’s home or vehicle) and conditions, such as being employed. Resources also include interpersonal (e.g., intimacy, affection) and intrapersonal (e.g., sense of life direction, hope) aspects. COR theory states that individuals are highly motivated to retain and protect these valued resources (Hobfoll, 2001).

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A central tenet of COR theory is that loss of valued resources following a traumatic event is centrally important in predicting adjustment. Resources loss is theorized to have such a strong impact on functioning in part because loss is highly costly to individuals because they must invest further resources to restore what has been lost (Hobfoll & Lilly, 1993). In addition, losing resources increases individuals' vulnerability to further resources loss, potentially resulting in a resource loss spiral (Hobfoll & Lilly, 1993). COR theory also states that individuals lacking in resources are more vulnerable to resource loss following a stressor or trauma.

In COR theory, resource gains are theorized to be important because they can buffer individuals from resource loss or can represent restoration of valued resources following loss (Hobfoll, 2001; Hobfoll & Lilly, 1993). However, resource gains are theorized to have a much weaker impact on adjustment than resource loss. Resource gain is theorized to be less clearly related to adjustment in part because individuals must invest extant resources in order to gain new resources (Hobfoll, 2001). In addition, because attempts to gain resources carry with them some risk (e.g., one risks rejection and loss of esteem in seeking social support), only individuals who already possess resources are likely to engage in efforts to gain more (Hobfoll & Lilly, 1993). As a result, individuals can experience resource gain spirals, where initial successful attempts to gain resources increase individuals' willingness to risk resources to gain further resources (Hobfoll & Lilly, 1993). COR theory also states that individuals engage in active coping following stressful and traumatic events in an effort to protect against resource loss, maintain extant resources, and gain new resources (Hobfoll, 2001).

Extant research strongly supports the central tenets of COR theory. In particular, resource loss has been associated with psychological distress among victims of a variety of mass traumas, including floods, hurricanes, earthquakes, and the September 11th attacks (Benight et al., 1999; Galea et al., 2002; Hobfoll, Tracy, & Galea, 2006; Sumer, Karanci, Berument, & Gunes, 2005; Waelde, Koopman, Rierdan, & Spiegel, 2001). In contrast, research examining the relationship between resource gain and overlapping constructs (e.g., posttraumatic

growth, benefit finding) and adjustment following trauma is equivocal. Some studies have found that resource gains are related to better adjustment; some have found resource gains to be related to worse adjustment; and some have failed to find a relationship between resource gains and adjustment (Helgeson, Reynolds, & Tomich, 2006; Hobfoll, Canetti-Nisim, & Johnson, 2006; Hobfoll, Tracy, & Galea, 2006; Zoellner & Maercker, 2006).

Both research assessing resource loss and gain following trauma has a number of limitations that should be acknowledged. First, with a few notable exceptions (e.g., Hobfoll, Johnson, Ennis, & Jackson, 2003), research has primarily used cross-sectional data and thus is limited in the extent to which conclusions can be reached regarding whether and how these processes are related to persistence of distress or trauma recovery (Helgeson et al., 2006; Schumm, Stines, Hobfoll, & Jackson, 2005). In addition, with a few exceptions (e.g., Banou, Hobfoll, & Trochelman, 2009; Hobfoll et al., 2003; Hobfoll, Canetti-Nisim, & Johnson, 2006), studies of resource loss have primarily focused on the role of loss of material resources (e.g., one's home, objects of sentimental value). Thus, it is unclear the extent to which loss of interpersonal and intrapersonal resources may relate to adjustment. This is particularly relevant to understanding adjustment following traumas that do not result in significant material losses (e.g., mass shootings vs. hurricanes). Also, studies of resource gains and related constructs have often relied on retrospective reports of these processes and may be subject to biases as a result of individuals' current levels of psychological functioning or trauma symptomatology (Zoellner & Maercker, 2006). There has also been much less focus on predictors of resource loss and gain following trauma, particularly using longitudinal assessments (Schumm et al., 2005; Zoellner & Maercker, 2006).

The current study sought to address some of these research limitations by conducting a longitudinal examination of the relationship of valued interpersonal and intrapersonal resource loss and gain to college students' psychological distress following the mass shooting at Virginia Tech (VT). The VT shooting occurred in April of 2007 and was the worst civilian mass shooting in U.S. history. It resulted in the deaths of 33 people, including the lone gunman, and

the wounding of an additional 25 individuals (Associated Press, 2007). The shooting represented a clear incident of mass trauma, potentially affecting all members of the university community in which it occurred. We examined the extent to which reports of interpersonal and intrapersonal resource loss and gain in the first 2 months after the shooting predicted psychological distress 6 months after the incident. We also examined the extent to which reports of initial resource losses and gains predicted experiencing further losses and gains over time.

In addition, the current study focused on identifying potential predictors of resource loss and gain. As COR theory states that individuals who lack resources are more vulnerable to resource loss, two markers of lack of resources prior to the shooting, preshooting social support and psychological distress, were evaluated as predictors of resource loss. Social support has been regarded as highly important in protecting individuals from resource loss following trauma (e.g., Adams, Boscarino, & Galea, 2006). For example, individuals with stronger support networks may be more able to adaptively respond to any actual interpersonal resource loss and are more able to receive assistance from others in restoring lost resources than individuals with less extensive networks. Social support may also be protective against the loss of intrapersonal resources (e.g., self-esteem, hope) following trauma. In contrast, psychological distress prior to trauma has been hypothesized to be a risk factor for experiencing resource loss (Adams et al., 2006), in part because individuals experiencing psychological distress are likely lacking in interpersonal and intrapersonal resources.

Preshooting social support and use of active coping with the shooting were examined as predictors of resource gain. As previously stated, social support represents an important resource reserve to respond to traumatic events. Specifically, individuals with strong support networks can mobilize these networks to respond to threats or losses to their resources. They can also utilize their support network to assist them in bolstering their intrapersonal resources (e.g., optimism, self-esteem) following trauma (Hobfoll, 2002; Kaniasty & Norris, 1993). Individuals with more extensive support networks may also have a stronger sense of efficacy to risk extant resources to obtain further

resources (Hobfoll, 2002). In addition, COR theory states that engaging in active, positive coping is necessary for intrapersonal resource gains, such as a greater sense of connectedness to others and greater self-efficacy, to occur following trauma (Hobfoll, 2002). Therefore, active coping with the shooting was hypothesized to predict resource gain.

## Method

### *Participants*

Participants were drawn from a sample of undergraduate Virginia Tech women who had previously participated in a multiuniversity survey of sexual victimization (data collected Fall 2006 and Spring 2007). Women were initially recruited for a study of negative sexual experiences through announcements on Psychology department research participant web pages. Participants received course credit for their participation. A total of 843 VT women participated in this study. Of these, 193 women responded to recruitment emails about a study related to adjustment following the campus shooting and completed two online surveys related to the campus shooting. The first survey was completed approximately 2 months after the shooting (Summer 2007) and the second survey was completed 6 months after the shooting (Fall 2007). Participants were 19.4 years of age on average ( $SD = 1.3$  years, range = 18–27 years) when they completed the initial preshooting survey. Eighty-seven percent characterized their ethnicity as White/European American, 5% as Asian/Pacific Islander, 2% as Black/African American, 2% as Latina, 3% as multiethnic, and 1% did not indicate their ethnicity or marked other.<sup>1</sup> Participants completed the 2-month postshooting survey an average of 181 days after the preshooting survey ( $SD = 46.2$  days, range 61–247 days).

Looking for differences among completers and noncompleters of the postshooting surveys, there was no evidence of differences on most

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<sup>1</sup> Among undergraduates enrolled at Virginia Tech 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](http://www.vt.edu/about/factbook/student_overview.php)).

variables (i.e., ethnicity, sexual assault history, preshooting depressive and anxious symptoms). Completers of the 2-month postshooting survey ( $n = 293$ ) were slightly older than noncompleters of this survey (noncompleter  $M = 19.1$  year),  $t(831) = 3.16, p < .005, d = .23$ , and completers reported slightly less social support than noncompleters  $t(840) = 3.09, p < .005, d = .22$ . There were no significant differences on any variables between women who only completed the 2-month postshooting survey ( $n = 100$ ) and women who completed both postshooting surveys.

### *Procedures*

Prior to the shooting, participants received course credit to take part in a multiuniversity online survey that screened women for negative sexual experiences, open to all women 18 years of age and older. As part of this survey, measures (administered in equivalent format to their paper-and-pencil versions) were completed regarding current depressive and anxiety symptoms and perceived social support adequacy. Email addresses were collected to award course credit. Of note, the victimization rate found in this study was similar to other recent surveys of college women (e.g., Hammond & Calhoun, 2007; Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004); thus, there was no evidence that victims were more likely to “select” to participate.

Approximately 2 months after the shooting (during Summer 2007), all Virginia Tech women who completed the initial survey were sent an email inviting them to participate in an online survey related to risk and resilience following the shooting. Twenty-three women (2.8%) could not be contacted because they had not provided an email address. Participants were provided with an electronic version of a consent form for the postshooting survey that delineated the types of information to be collected, the fact that participants’ responses would be linked with their responses to the prior survey, and compensation for participating in the postshooting survey. The postshooting survey assessed exposure to the shooting incident, current distress (e.g., anxious and depressive symptoms), resource loss and gain following the shooting, and coping strategies used in connection to the shooting. All standardized mea-

asures were administered in an equivalent format to their paper-and-pencil version. Participants had four weeks to complete the survey and were sent up to five electronic reminders. Participants could contact the investigators if they did not wish to receive further emails; only four did so. Participants were compensated \$20 with either a gift certificate or a donation made to a memorial fund for the shooting victims.

Six months after the shooting (during Fall 2007), women were sent an email inviting them to complete an additional online postshooting survey. Participants were again given four weeks to complete this survey and were sent up to five electronic reminders. This survey assessed current adjustment, including current distress, and resource loss and gain in the time period between the two assessments. Participants were similarly compensated for completing this second survey. All surveys were approved by the university institutional review board and the two postshooting surveys were approved by a university committee developed to ensure ethical conduct in shooting-related research.

### *Measures Administered in Each Survey*

*Center for Epidemiologic Studies Depression Scale.* The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item, self-report measure of primarily the affective component of depressive symptomatology. A sample item is, “I felt depressed.” For each item, individuals indicated how often they had felt that way in the past week on a 4-point Likert 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*). Prior research supports the internal consistency, test–retest reliability, and validity of this measure (Radloff, 1977; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Cronbach’s alpha in the current sample across assessments ranged from .87 to .91.

*Four Dimensional Anxiety Scale.* The Four Dimensional Anxiety Scale (FDAS; Bystritsky, Linn, & Ware, 1990) is a 35-item, self-report measure of the affective, cognitive, behavioral, and physiological components of anxiety. A sample item is, “Feeling tense?” For each item, individuals indicated how often they had felt in the described manner in the past week on a

5-point Likert scale bounded by 1 (*not at all*) and 5 (*extremely*). Prior research supports the internal consistency and validity of the measure (Bystritsky et al., 1990; Stoessel, Bystritsky, & Pasnau, 1995). Cronbach's alpha of the subscales in the current sample across assessments ranged from .81 to .88.

*Multidimensional Scale of Perceived Social Support.* The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item measure of perceived social support adequacy. A sample item is, "There is a special person around when I am in need." For each item, individuals indicated the extent to which they agreed with the statement on a 7-point Likert scale bounded by 1 (*very strongly disagree*) and 7 (*very strongly agree*). The measure has three subscales: perceived support from family, perceived support from friends, and perceived support from a significant other. Prior research supports the internal consistency and factor structure of the measure (Zimet et al., 1988). Cronbach's alpha of the subscales in the current sample ranged from .93 to .96.

### *Postshooting Survey Measures*

*Exposure to the shooting incident.* Participants were asked a number of yes/no questions regarding their direct exposure to several aspects of the shooting (e.g., if they were on campus during the shooting, if they heard gunfire). They were also asked if they knew anyone who was killed in the shooting and their relationship with that person or persons. Finally, participants were asked to indicate the extent to which they thought their own and loved ones lives were in danger during the shooting using two 5-point Likert scale items bounded by 0 (*Not at all/No chance you or others would be killed*) and 4 (*Completely/Felt convinced you or others would be killed*). Participants were placed into one of three exposure groups based on their responses to these items: no direct exposure, moderate direct exposure (on campus, saw police/security), and severe direct exposure (in one of the buildings where the shootings occurred, heard gunfire, saw individuals who had been wounded or killed). Among participants who knew someone killed in the shooting, we recorded whether this relationship was a

friendship or a more casual acquaintance (e.g., classmate, professor).

*Resource loss and gain.* Participants were administered 27 items from the Conservation of Resources Evaluation (COR-E; Hobfoll, 2001). Like prior research following mass trauma (e.g., Hobfoll, Tracy, & Galea, 2006), items were selected as those that participants could potentially have lost or gained as a result of the shooting. For the 2-month postshooting survey, participants were asked the extent to which they had lost or gained each resource since the shooting (for the 6-month postshooting assessment, participants were asked the extent to which they had lost or gained each resource in the past four months) on a 5-point Likert scale anchored by -2 (*great deal of loss*) and 2 (*great deal of gain*). A loss score was created by recoding responses as 2 (*great deal of loss*), 1 (*some loss*), and 0 (*no loss*; Hobfoll, Tracy, & Galea, 2006). Because no factor structure of this measure has been established in prior research, principal axis factoring of these items using a varimax rotation with the 2-month postshooting survey data was conducted. This resulted in three interpretable factors: life direction/pride loss (10 items; e.g., feeling that I am successful, sense of pride in myself), interpersonal resource loss (7 items; e.g., companionship, loyalty of friends), and optimism resource loss (5 items; e.g., sense of optimism, hope). Cronbach's alpha for these scales across assessments ranged from .79 to .87. A gain score was similarly created by recoding responses as 2 (*great deal of gain*), 1 (*some gain*), and 0 (*no gain*). Principal axis factoring of these items resulted in three interpretable factors: sense of self/optimism gain (10 items; e.g., hope, positive feelings about myself), interpersonal resource gain (9 items; e.g., intimacy with one or more family members, time with loved ones), and self-control gain (7 items; e.g., feeling that I have control over my life, self-discipline). Cronbach's alpha for these scales across assessments ranged from .85 to .91.

*Coping Strategies Inventory.* The 32-item, short form of the Coping Strategies Inventory (CSI; Tobin, 2001; Tobin, Holroyd, Reynolds, & Wigal, 1989) was administered to assess strategies used to cope with the shooting. For each item, individuals rated how often they used the strategy in coping with the shooting on a 5-point Likert scale anchored by 1 (*not at all*)

and 5 (*very much*). This measure includes two engagement and two disengagement coping scales. Because we were interested in examining use of active coping strategies, only scores on the problem engagement scale were utilized. This scale consists of eight items assessing use of active behavioral and cognitive coping strategies. Sample items are “I looked at things in a different light and tried to make the best of what was available” and “I made a plan of action and followed it.” Cronbach’s alpha of this scale was .83.

### *Analysis Plan*

Latent variable structural equation modeling (SEM) with the Mplus program (version 5.1; Muthén & Muthén, 1998-2007) was utilized. Structural equation modeling was chosen over regression or path analysis due to its ability to account for measurement error in the assessment of latent constructs (e.g., social support, resource loss), to evaluate the overall fit of the specified models as well as its components, and to compare the fit of multiple models directly (Schreiber, Stage, King, Nora, & Barlow, 2006). To assess model fit, in addition to the model  $\chi^2$ , we examined four fit indices. The RMSEA assesses model misfit per degree of freedom, with values of approximately .06 or less indicative of good fit (Hu & Bentler, 1999). The CFI and TLI measure improvement in fit when the model tested is compared to an independence model, with values closer to .95 indicative of good fit (Hu & Bentler, 1999). The SRMR is a measure of the mean absolute correlation residual, that is, the difference between the observed and predicted correlations overall, with values less than .10 considered acceptable (Kline, 2005). We also examined the model modification indices, which estimate the extent to which the overall model chi square would decrease if a particular path, currently fixed to zero, were estimated in the model (Kline, 2005). Changes were made to the model as a result of modification indices only if such changes were theoretically justified to avoid problems with increased Type I error rates associated with such model respecifications (Tomarken & Waller, 2003). An additional rule of thumb used was that model modifications should be considered if the modification index value is over 100.

The order of analyses was as follows. First, confirmatory factor analysis (CFA) was used to evaluate the latent variable (LV) measurement models. These were preshooting psychological distress (CES-D and the subscales of the FDAS from the preshooting survey), preshooting social support (subscales of the MSPSS from the preshooting survey), 6-month shooting related psychological distress (CES-D and the subscales of the FDAS from the 6-month postshooting shooting survey), and resource loss (loss scores on the three subscales of the COR-E at the 2- and 6-month postshooting assessments). A second CFA evaluated resource gain (gain scores on the three subscales of the COR-E at the 2- and 6-month assessments).

Next, a structural model predicting psychological distress 6 months after the shooting was evaluated, which included preshooting psychological distress, preshooting social support, and resource loss (at the 2- and 6-month postshooting assessments) after the shooting. A similar model predicting psychological distress 6 months after the shooting was evaluated, including preshooting social support, active coping (modeled as an observed variable), and 2- and 6-month postshooting resource gain. The loss and gain models were compared to a model in which the error terms for the two resource measurement points were allowed to correlate, but the path from 2- month to 6-month resources was omitted. The two models were compared through a chi square difference test (Kline, 2005). This enabled us to evaluate whether the model including the path from 2- to 6-month resources provided superior fit to the data than a model only accounting for the fact that the error variance of multiple assessments utilizing the same measure are correlated.

## Results

### *Exposure/Loss and Adjustment Following the Shooting*

The vast majority of participants (79%) reported some direct exposure to the shooting. Forty-six percent reported moderate direct exposure (on campus, saw police/security), whereas 33% reported more severe direct exposure (in one of the buildings where the shootings occurred during the shooting, heard gunfire, saw individuals who had been wounded or

killed). None of the participants reported being physically hurt or seeing the gunman during the shooting. Sixty-five percent of participants reported that they knew someone who was killed in the shooting. Of these individuals, 46% reported that a friend was killed in the shooting, whereas 54% reported that they had a more casual relationship with the individual or individuals killed (e.g., classmate, professor). Thirty-four percent of participants reported believing that there was at least a fairly good chance that they would be killed during the shooting and 80% reported believing there was at least a fairly good chance that a loved one would be killed.

Participants' scores on the preshooting and postshooting survey measures are summarized in Table 1. Missing data for all variables was

1% or less. The kurtosis values for the FDAS cognitive subscale of the preshooting survey and the 2- and 6-month postshooting interpersonal loss subscales of the COR-E were above the cut-off of 10 for indicating a potential problem. These variables were successfully transformed by raising them to the 1/3 power before conducting the SEM analyses (Kline, 2005). The correlations among the measures utilized in the subsequent structural models are presented in Table 2.

Because participants varied in their level of exposure to the shooting, we evaluated whether this was related to any of the postshooting variables in the models with Bonferroni-adjusted regressions. None of these analyses were significant, and, thus, level of exposure to the shooting was not controlled for in the subsequent

Table 1  
*Descriptive Statistics for Observed Variables*

Measure	<i>M</i>	<i>SD</i>	Skew	Kurtosis
Preshooting psychological distress				
CES-D	13.73	9.34	1.07	0.77
FDAS- physiological	17.34	6.57	1.16	0.74
FDAS- cognitive	13.52	5.31	2.88	11.44
FDAS- behavioral	21.67	6.48	0.43	-0.11
FDAS- emotional	10.61	3.93	0.74	0.20
Preshooting social support				
Significant other	22.45	6.84	-1.34	0.87
Friend	23.17	5.72	-1.72	2.84
Family	21.97	5.95	-1.15	0.83
Resource loss (2-month)				
Life direction/pride	1.14	2.33	2.88	9.07
Optimism	1.56	1.90	1.31	1.42
Interpersonal	0.39	1.34	5.50	35.01
Resource gain (2-month)				
Sense of self	5.06	4.33	1.10	1.14
Interpersonal	6.28	4.06	0.45	-0.35
Self-control	2.26	2.64	1.78	3.72
Active coping (CSI)	17.41	5.96	0.76	0.25
Postshooting psychological distress (6-month)				
CES-D	14.59	9.98	0.71	0.07
FDAS- physiological	16.83	6.50	1.40	2.55
FDAS- cognitive	13.94	5.38	2.32	7.34
FDAS- behavioral	21.27	7.02	0.71	0.10
FDAS- emotional	11.13	4.42	0.61	-0.36
Resource loss (6-month)				
Life direction/pride	1.27	2.47	2.48	5.87
Optimism	0.95	1.42	1.56	1.63
Interpersonal	0.66	1.52	3.75	18.94
Resource gain (6-month)				
Sense of self	6.00	5.17	0.89	0.20
Interpersonal	5.81	4.15	0.74	0.22
Self-control	3.51	3.26	1.27	1.61

Table 2  
Correlations Among Observed Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CES-D (pre)	—															
2. FDAS physio (pre)	.64	—														
3. FDAS cog (pre)	.69	.66	—													
4. FDAS beh (pre)	.54	.59	.58	—												
5. FDAS emot (pre)	.74	.75	.67	.70	—											
6. Support sig other (pre)	-.23	-.00	-.06	-.04	-.15	—										
7. Support friend (pre)	-.29	-.23	-.25	-.10	-.24	.35	—									
8. Support family (pre)	-.28	-.09	-.14	-.12	-.12	.37	.51	—								
9. Life direction loss (2-mo)	.32	.27	.31	.28	.23	-.10	-.27	-.21	—							
10. Interpersonal loss (2-mo)	.11	.01	.08	.10	-.01	-.16	-.20	-.26	.50	—						
11. Optimism loss (2-mo)	.19	.21	.25	.24	.22	-.07	-.13	-.11	.60	.37	—					
12. Sense of self gain (2-mo)	-.16	-.11	-.16	-.06	.01	.03	.18	.12	NA	NA	NA	—				
13. Interpersonal gain (2-mo)	-.07	.01	-.00	.03	.04	.07	.24	.21	NA	NA	NA	.62	—			
14. Self-control gain (2-mo)	-.07	-.05	-.08	-.03	-.03	.01	.12	.08	NA	NA	NA	.74	.53	—		
15. Active coping	-.06	-.10	-.04	.01	-.04	.01	.13	.10	-.10	-.05	-.18	.50	.31	.32	—	
16. CES-D (6-mo)	.40	.37	.30	.29	.32	-.17	-.18	-.25	.38	.19	.31	-.24	-.07	-.15	-.25	—
17. FDAS physio (6-mo)	.31	.48	.31	.33	.37	-.07	-.13	-.16	.29	.15	.30	-.09	.01	-.03	-.10	.70
18. FDAS cog (6-mo)	.25	.32	.33	.27	.26	-.05	-.05	-.14	.34	.14	.34	-.17	-.00	-.08	-.08	.68
19. FDAS beh (6-mo)	.34	.36	.38	.55	.39	-.15	-.12	-.16	.35	.05	.33	-.11	.07	-.04	.01	.48
20. FDAS emot (6-mo)	.36	.45	.31	.38	.44	.08	-.15	-.18	.38	.01	.35	-.17	-.02	-.11	-.16	.81
21. Life direction loss (6-mo)	.18	.21	.21	.19	.14	.00	.01	-.07	.26	.17	.19	-.11	-.04	-.06	-.08	.48
22. Interpersonal loss (6-mo)	.08	.08	.17	.10	.05	-.09	-.13	-.18	.50	.33	.30	-.12	-.03	-.07	-.09	.35
23. Optimism loss (6-mo)	.20	.23	.22	.23	.23	.09	.02	-.08	.60	.28	.45	-.20	-.03	-.14	-.16	.44
24. Sense of self gain (6-mo)	-.12	-.04	.01	.06	.01	.05	.16	.07	-.21	-.15	-.19	.43	.32	.33	.33	-.41
25. Interpersonal gain (6-mo)	-.02	-.02	-.01	.14	.06	.07	.28	.15	-.13	-.16	-.09	.31	.36	.28	.25	-.29
26. Self-control gain (6-mo)	-.03	.04	.01	.11	.05	.05	.12	.05	-.13	-.10	-.15	.38	.27	.39	.24	-.25

Correlations Among Observed Variables

	17	18	19	20	21	22	23	24	25
17. FDAS physio (6-mo)	—								
18. FDAS cog (6-mo)	.72	—							
19. FDAS beh (6-mo)	.59	.60	—						
20. FDAS emot (6-mo)	.81	.76	.64	—					
21. Life direction loss (6-mo)	.29	.40	.22	.40	—				
22. Interpersonal loss (6-mo)	.32	.31	.19	.35	.49	—			
23. Optimism loss (6-mo)	.38	.47	.29	.48	.57	.35	—		
24. Sense of self gain (6-mo)	-.16	-.23	.02	-.25	-.39	-.23	-.32	—	
25. Interpersonal gain (6-mo)	-.12	-.14	.07	-.21	-.24	-.33	-.17	.74	—
26. Self-control gain (6-mo)	-.08	-.12	.06	-.17	-.25	-.17	-.30	.86	.69

Note. Covariance matrix available from authors by request.

structural models. Similarly, we evaluated whether loss of a friend in the shooting was related to any of the postshooting variables in the models through use of Bonferroni-adjusted regressions. None of these analyses were significant, and loss of a friend in the shooting was not controlled for in the subsequent structural models. In addition, because participants differed in the amount of time elapsed between when they completed the pre- and postshooting assessments, we evaluated whether the number of days elapsed between assessments moderated the relationships between preshooting social support and resource loss and gain, as well as whether it moderated the relationship between preshooting psychological distress and resource loss. None of these analyses were significant and, therefore, time between completion of the preshooting and 2-month postshooting assessments was not controlled for in the subsequent structural models.

#### *SEM Models Predicting 6-Month Postshooting Psychological Distress From 2- and 6-Month Resource Loss and Gain*

The CFA of the preshooting psychological distress LV showed adequate fit,  $\chi^2(5) = 3.63$ ,  $p = .60$ , CFI = 1.00, TLI = 1.02, RMSEA = 0.00, SRMR = 0.02. The CFA of the 6-month postshooting psychological distress LV similarly showed adequate fit,  $\chi^2(5) = 16.90$ ,  $p < .01$ , CFI = 0.98, TLI = 0.95, RMSEA = 0.11, SRMR = 0.03. The preshooting social support and postshooting resource loss LVs were just identified. A measurement model including the pre- and 6-month postshooting psychological distress, preshooting social support, 2- and 6-month resource loss LVs, and the covariances among them showed adequate fit,  $\chi^2(134) = 211.31$ ,  $p < .001$ , CFI = 0.95, TLI = 0.93, RMSEA = 0.06, SRMR = 0.06. The error terms for the 2- and 6-month resource loss variables and pre- and postshooting psychological distress variables were allowed to covary in this measurement model and the SEM. Similarly, a measurement model, including the postshooting psychological distress, preshooting social support, 2- and 6-month resource gain LVs, and the covariances among them, showed adequate fit,  $\chi^2(68) = 132.10$ ,  $p < .001$ , CFI = 0.96, TLI = 0.94, RMSEA = 0.07, SRMR = 0.06.

The error terms for the 2- and 6-month resource gain variables were allowed to covary in this measurement model and the SEM.

The structural resource loss model including the hypothesized paths among preshooting psychological distress, 6-month postshooting psychological distress, preshooting social support, and 2- and 6-month resource loss demonstrated adequate fit,  $\chi^2(138) = 233.30$ ,  $p < .005$ , CFI = 0.93, TLI = 0.92, RMSEA = 0.06, SRMR = 0.09, and is depicted in Figure 1. All the direct paths among social support, resource loss, and psychological distress were statistically significant. The model explained 44% of the variance in 6-month postshooting psychological distress, 32% of the variance in 6-month postshooting resource loss, and 25% of the variance in 2-month postshooting resource loss. All of the total model indirect paths were statistically significant and are depicted in Table 3. There were no theoretically indicated modification indices and the value of all modification indices was less than 20.0. In addition, this model demonstrated superior fit over a model where the path from 2- to 6-month postshooting resource loss was omitted,  $\chi^2_{diff}(1) = 12.35$ ,  $p < .005$ .

The structural resource gain model, including the hypothesized paths among 6-month postshooting psychological distress, preshooting social support, active coping and 2- and 6-month postshooting resource gain, demonstrated adequate fit,  $\chi^2(82) = 157.99$ ,  $p < .005$ , CFI = 0.95, TLI = 0.94, RMSEA = 0.07, SRMR = 0.07, and is depicted in Figure 2. All the direct paths among preshooting social support, active coping, 2- and 6-month postshooting resource gain, and 6-month postshooting psychological distress were statistically significant. The model explained 8% of the variance in 6-month postshooting psychological distress, 21% of the variance in 6-month postshooting resource gain, and 28% of the variance in 2-month postshooting resource gain. The total indirect paths from preshooting social support to 6-month postshooting psychological distress and from preshooting social support to 6-month postshooting resource gain were not significant. The other total indirect paths were all statistically significant and are depicted in Table 4. There were no theoretically indicated modification indices and the value of all modification indices was less than 25.0. In addition, this

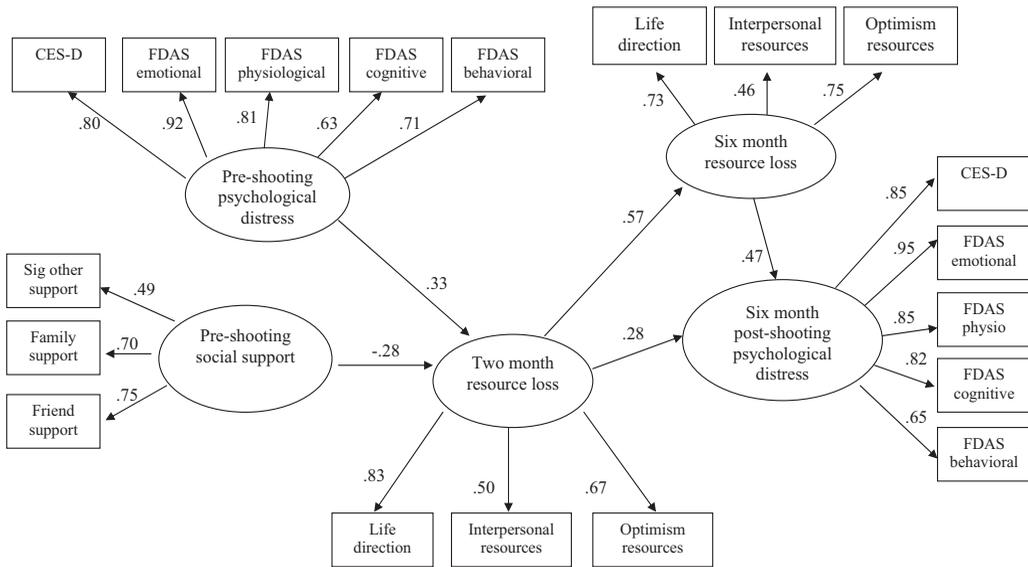


Figure 1. SEM depicting the relations among pre- and postshooting psychological distress, 2-month and 6-month postshooting resource loss, and preshooting social support.

model demonstrated superior fit over a model where the path from 2- to 6-month postshooting resource gain was omitted,  $\chi^2_{diff}(1) = 15.75, p < .005$ .

Discussion

Results supported several tenets of conservation of resources theory that have not been extensively empirically evaluated in prior trauma research. Results also supported the applicability of COR theory to understanding ad-

justment following traumas not resulting in significant material loss. First, supporting the primacy of resource loss in predicting adjustment, resource loss in the initial aftermath of the shooting prospectively predicted psychological distress 6 months after the shooting. In addition, supporting the notion that those lacking resources prior to a trauma are more vulnerable to loss, two markers for a relative lack of resources prior to the shooting (poor social support and experiencing psychological distress) prospectively predicted resource loss following the

Table 3  
Total and Specific Indirect Effects of SEM Model Depicting Relations Among 6-Month Postshooting Psychological Distress, 2- and 6-Month Resource Loss, Preshooting Social Support, and Preshooting Psychological Distress

Pathway	$\beta$
<b>Pre-shooting distress → Post-shooting distress</b>	<b>.18*</b>
Pre-shooting distress → 2-month resource loss → Post-shooting distress	.09
Pre-shooting distress → 2-month resource loss → 6-month resource loss → Post-shooting distress	.09*
<b>Pre-shooting social support → Post-shooting distress</b>	<b>-.15*</b>
Pre-shooting social support → 2-month resource loss → Post-shooting distress	-.08
Pre-shooting social support → 2-month resource loss → 6-month resource loss → Post-shooting distress	-.08
<b>2-month resource loss → 6-month resource loss → Post-shooting distress</b>	<b>.54***</b>
<b>Pre-shooting distress → 2-month resource loss → 6-month resource loss</b>	<b>.19*</b>
<b>Pre-shooting social support → 2-month resource loss → 6-month resource loss</b>	<b>-.16*</b>

Note. Total indirect effects are bolded; specific indirect effects are listed below total indirect effect.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .005$ .

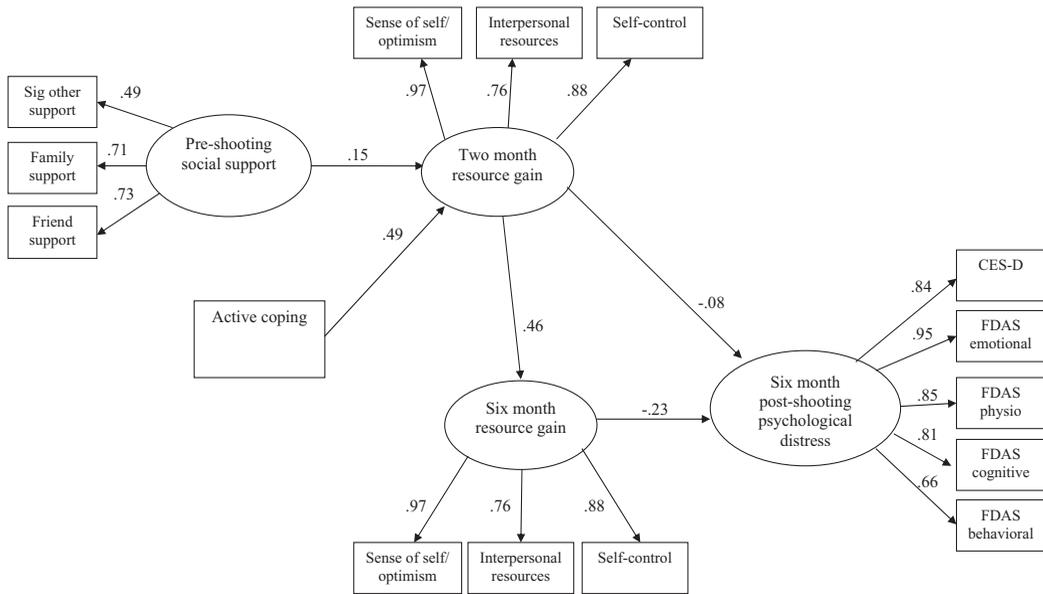


Figure 2. SEM depicting the relations among 6-month postshooting psychological distress, 2- and 6-month postshooting resource gain, preshooting social support, and active coping.

shooting. Results also supported the notion of a resource loss spiral; individuals who reported experiencing resource loss in the first 2 months after the shooting were more likely to report experiencing further resource loss in the following four months.

In addition, results potentially expanded the applicability of COR theory in several ways. Results supported the relevance of resource loss in understanding adjustment following traumas that do not result in significant material resource loss, as well as the importance of loss of intan-

gible but highly valued resources, such as optimism, in individuals' adjustment following a trauma. This finding represents a potential mechanism for understanding why some individuals who are indirectly exposed to a trauma and experience no significant material loss still experience significant and persistent distress after this event. Specifically, these individuals may have experienced losses of highly valued intangible resources, likely in part because they were vulnerable to experiencing such loss prior to the trauma.

Table 4  
Total and Specific Indirect Effects of SEM Model Depicting Relations Among 6-Month Postshooting Psychological Distress, 2- and 6-Month Resource Gain, Preshooting Social Support, and Active Coping

Pathway	$\beta$
<b>Pre-shooting social support</b> → <b>Post-shooting distress</b>	<b>-.03</b>
Pre-shooting social support → 2-month resource gain → Post-shooting distress	-.01
Pre-shooting social support → 2-month resource gain → 6-month resource gain → Post-shooting distress	-.02
<b>Active coping</b> → <b>Post-shooting distress</b>	<b>-.09*</b>
Active coping → 2-month resource gain → Post-shooting distress	-.04
Active coping → 2-month resource gain → 6-month resource gain → Post-shooting distress	-.05*
<b>2-month resource gain</b> → <b>6-month resource gain</b> → <b>Post-shooting distress</b>	<b>-.19*</b>
<b>Pre-shooting social support</b> → <b>2-month resource gain</b> → <b>6-month resource gain</b>	<b>.07</b>
<b>Active coping</b> → <b>2-month resource gain</b> → <b>6-month resource gain</b>	<b>.23***</b>

Note. Total indirect effects are bolded; specific indirect effects are listed below total indirect effects.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .005$ .

Consistent with COR theory's assertion that resource gains are less influential than resource losses, resource gain was positively but weakly related to lower levels of psychological distress 6 months after the shooting. Resource gain following the shooting was also predicted by social support prior to the trauma. This is consistent with the notion that individuals with greater resource reserves are more able and willing to engage in the actions necessary to experience resource gain following a threat to those resources. It also suggests that interpersonal resources may be critically important in preventing loss and promoting resource gain following trauma. Resource gain was also strongly predicted by active coping with the shooting. One possible explanation of this finding is that those individuals who experience resource gain following a trauma are not necessarily individuals whose resources are not threatened by the trauma. Instead, individuals who experience resource gain are able to successfully mobilize their resources and respond adaptively to the threat of loss presented by the trauma.

Limitations of the current study should be noted, however. First, the sample consisted of women with low to moderately severe levels of direct exposure to the shooting incident, and, thus, the results may not be applicable to those with more severe levels of exposure (e.g., individuals who were fired upon or saw the shooter during the incident). The fact that individuals with the highest level of exposure were not included in the sample may also explain why exposure levels were not related to posttrauma adjustment. However, it is interesting to note that recent studies of victims of ongoing terrorist threat have similarly found that level of exposure was unrelated to adjustment or no longer predicted adjustment once resource loss was accounted for (Hall et al., 2008; Hobfoll, Canetti-Nisim, & Johnson, 2006; Hobfoll et al., 2008). Another limitation was that the proportion of individuals from the initial survey who completed the 2-month postshooting survey was approximately 38%. In addition, only 66% of individuals who completed the 2-month postshooting survey completed the 6-month follow-up. It should be noted, however, that the initial response rate was comparable to prior research using web surveys (Cook, Heath, & Thompson, 2000), and there was little evidence of any

significant differences between responders and nonresponders. Another limitation was the use of a single measure to assess resource loss and gain, preventing simultaneous evaluation of the impact of loss and gain on adjustment. For example, resource gain may be a more powerful predictor of adjustment among those who lost resources following the trauma. Analyses also rely on self-report data, and data on some variables were not collected prior to the trauma, including prior trauma history and pretrauma resource loss and gain. Finally, the resource loss and gain items did not specifically assess religious or spiritual losses or gains, which may be highly relevant and important to adjustment following a traumatic event (e.g., Pargament, Desai, & McConnell, 2006).

Bearing these limitations in mind, results have a number of implications for research and interventions following mass trauma. First, results support the need for interventions in communities affected by mass traumas, given that many individuals are directly exposed to aspects of the trauma and its aftermath and are potentially at risk for experiencing loss of important interpersonal and intrapersonal resources as well as psychological distress. Results also support that those individuals already lacking important resources (e.g., those experiencing psychological distress and lacking in support) are likely most vulnerable and, therefore, in need of intervention. In addition, interventions targeted at assisting individuals in restoring lost resources or preventing resource loss, such as through assisting them in forming and restoring relationships with others and engaging in other important goal-directed behaviors to restore lost resources, have a clear potential to be effective at ameliorating distress. Finally, results supported that experiencing resource gain may represent part of an adaptive coping process. However, the weak relationship between resource gain and lower levels of psychological distress suggest that interventions solely focused on assisting individuals to experience resource gains following trauma may not lead to a significant impact on distress levels, particularly if they do not also address restoration of valued lost resources. Therapeutic interventions to promote resource gains may instead be potentially important for long-term adjustment posttrauma, after significant resource losses have been addressed.

Findings also present a number of implications for future research. First, there is a clear need for further longitudinal studies examining the impact of resource loss and gain on post-trauma adjustment and recovery. There also is a need for more research evaluating predictors of resource loss and gains following different traumas. Results of the current study suggest that resource loss and gain may arise from different pathways. At least for interpersonal and intrapersonal resources, poor pretrauma adjustment and social support (i.e., lacking resources pretrauma) appear to represent vulnerability factors for experiencing resource loss. In contrast, resource gain may be more clearly associated with posttrauma processes, such as support seeking related to the trauma and coping efforts. Resource gain may also only occur among those with some minimal level of pretrauma resources to enable them to engage in extensive active coping effort. Efforts to gain resources may also reflect attempts to prevent resource loss among those who perceive that their valued intra- and interpersonal resources are threatened by the trauma. There also is a need for further evaluation of the interactions between losses and gains following trauma. For example, perhaps successful efforts to gain resources could offset the negative impact of initial resource loss and prevent long-term adjustment difficulties (e.g., Hobfoll, 2001). It is also possible that while resource loss may be closely related to psychological distress, resource gain may be related to other aspects of adjustment such as well-being, worldview, or feelings of efficacy. Research in these areas will lead to a fuller understanding of adjustment and recovery following trauma and the role that losses and gains play in that adjustment.

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