

# Coping Self-Efficacy Perceptions as a Mediator Between Acute Stress Response and Long-Term Distress Following Natural Disasters

Charles C. Benight<sup>1,2</sup> and Michelle L. Harper<sup>1</sup>

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The mediating effect of coping self-efficacy (CSE) perceptions between acute stress responses (ASR) and 1-year distress following two disasters was tested. Between 3 and 8 weeks after the second disaster and again at 1 year, 46 residents completed questionnaires. Posttraumatic Stress Disorder (PTSD) symptoms and global distress served as outcomes. Multiple regression demonstrated that ASR and Time 1 CSE were significant predictors of both Time 1 outcomes. Time 1 PTSD symptoms and Time 2 CSE were significant factors for Time 2 PTSD symptoms. Gender was significant for Time 2 PTSD symptoms, but not for Time 2 global distress. Longitudinally, Time 1 CSE predicted Time 2 PTSD symptoms, but not general distress. CSE mediated between ASR and both psychological outcomes at Time 2. Coping self-efficacy perceptions provide a possible intervention target.

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**KEY WORDS:** coping self-efficacy; natural disasters; acute stress response; posttraumatic stress.

## Introduction

On May 18, 1996 a 12,000-acre fire ravaged a small mountain community in Colorado. The entire community was evacuated for over 72 hr, several homes were lost to the flames, and the surrounding landscape completely charred. On July 13 the same year, a flash flood killed two individuals and destroyed the community's fire station, water supply, phone service, electricity, and major transportation routes into and out of the area. The entire community was without electricity for 2 days, without water for 1 month, and without telephone service for 2 months. The initial response during traumatic events is referred to as acute stress response (ASR). ASR is defined as the emotional, dissociative, and physical reaction during a

traumatic event. ASR has been shown to be predictive of subsequent ability to recover (Classen, Koopman, & Spiegel, 1993; Spiegel & Cardena, 1991). Although several premorbid factors have been found to contribute to the predictive effect of ASR on subsequent distress (e.g., previous history of abuse, genetic predisposition; Marmar, Weiss, & Metzler, 1998), the factors that mediate *between* the ASR and psychological distress are still unknown. One potential mediator is an individual's perceived coping self-efficacy (CSE). CSE is defined as the perceived capability for managing posttraumatic recovery demands. CSE perceptions provide a direct intervention target that can be utilized to enhance perceived control over the chaotic postdisaster environment (Baum, Cohen, & Hall, 1993; Benight, Swift, Sanger, Smith, & Zeppelin, 1999). The purpose of this study was to investigate the mediational influence of CSE perceptions on the relationship between ASR and subsequent psychological distress following two natural disasters. Before reviewing the research on CSE as a possible mediator of the relationship between ASR and chronic distress, it is important to review the research linking ASR and posttraumatic stress symptoms.

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<sup>1</sup>Department of Psychology, University of Colorado at Colorado Springs, Colorado Springs, Colorado.

<sup>2</sup>To whom correspondence should be addressed at Department of Psychology, University of Colorado at Colorado Springs, 1420 Austin Bluffs Parkway, P.O. Box 7150, Colorado Springs, Colorado 80933-7150; e-mail: benight@mail.uccs.edu.

### *ASR and Long-Term Distress After Trauma*

The term ASR has been utilized to describe traumatic responses varying in time from during the trauma to days or even weeks after the event. For example, ASR is often used interchangeably with peritraumatic response in describing the reaction that occurs *during* the trauma (Shalev, 1996). However, ASR has also been used to describe reactions that occur during *and* shortly after the trauma (e.g., 1 week; Koren, Arnon, & Klein, 1999). Finally, with the inclusion of Acute Stress Disorder in the *DSM-IV*, the ASR must last at least 2 consecutive days following the trauma, yet these 2 days can occur any time during the first 30 days after the event (American Psychiatric Association [APA], 1994).

This confusion concerning the time frame associated with specific reactions to a trauma obscures our ability to critically understand the developmental processes associated with Posttraumatic Stress Disorder (PTSD). To help clarify these issues we are restricting ASR in the present study to the extent of emotional reactivity, dissociation, and physical distress experienced by the person *during* the trauma.

Theoretically, the progression of ASR into PTSD involves continual difficulties with intrusive thoughts, avoidance behaviors, and emotional numbing that last after the traumatic event is over. Evidence of the predictive effect of ASR for PTSD has been found in numerous retrospective and prospective studies (Bremner et al., 1992; Epstein, Fullerton, & Ursano, 1998; Griffin, Resick, & Mechanic, 1997; Marmar et al., 1994, 1999; Marmar, Weiss, Metzler, & Delucchi, 1996; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996; Roemer, Orsillo, Borkovec, & Litz, 1998; Shalev et al., 1998; Shalev, Peri, Canetti, & Schreiber, 1996; Spiegel, Koopman, Cardena, & Classen, 1996; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996; Ursano et al., 1999; Weiss, Marmar, Metzler, & Ronfeldt, 1995). However, Freedman, Brandes, Peri, and Shalev (1999) reported that depression scores measured at 1 week, 1 month, and 4 months were the strongest predictor of 1 year PTSD diagnosis, whereas dissociation during the trauma was not significant. Undoubtedly, other factors (e.g., female gender, socioeconomic level, history of child abuse, neuroticism) interact with ASR to compound its effect in the development of PTSD (Epstein et al., 1998; Freedman et al., 1999; McFarlane, 1989; Shalev et al., 1996).

Theoretically, the initial ASR leads to PTSD due to symptoms of dissociation, hyperarousal, and avoidance of trauma related stimuli that inhibit the individual from modifying the cognitive schema of the trauma thereby restricting healthy resolution of the traumatic event (Foa

& Hearst-Ikeda, 1996). Social cognitive theory provides a valuable addition to this theory with a testable, and potentially clinically useful, explanation for the interactive coping process between the individual and the posttrauma environment. Indeed, we are suggesting that the trauma schema is evolving as the individual attempts to cope with posttraumatic demands and is strongly influenced by the self-evaluative process outlined in social cognitive theory.

### *CSE and Trauma Recovery*

Bandura's social cognitive theory posits that humans are direct agents in shaping and responding to environmental conditions (Bandura, 1997). Through cognitive interpretation of internal and environmental feedback, humans self-regulate in order to direct behaviors toward desired outcomes. Reciprocal interactions between the environment, one's behaviors, and self-evaluations combine to direct subsequent behaviors and perceptions of coping effectiveness. People utilize self-evaluation (i.e., "Are my actions succeeding in obtaining the outcome I desire?") in order to modify behaviors in response to environmental demands thereby achieving determined goals. It is this self-evaluative process that determines perceptions of CSE (i.e., appraised capability to manage the threatening situation). CSE plays a primary role in development of vigilance toward potential threats, handling of emotions, and orchestration of coping behaviors. Research on trauma specific CSE (i.e., CSE directly tied to the specific coping demands of the traumatic situation) has shown CSE to be related to posttrauma recovery both cross-sectionally and longitudinally.

CSE has consistently explained a significant proportion of the variance over and above other critical factors in cross-sectional studies with natural disaster survivors. For example, in a cross-sectional study of HIV+ men following Hurricane Andrew, Benight et al. (1997) reported that CSE accounted for 51, 27, and 28% of the variance over and above threat of death, CD4 counts, estimated damage, income, and education for PTSD symptoms, general distress, and a norepinephrine to cortisol ratio, respectively. In a subsequent study with healthy community volunteers following Andrew, Benight, Ironson, Klebe, et al. (1999) demonstrated in a longitudinal causal model analysis that acute CSE had a direct negative pathway to acute psychological distress and to distress 9 months later. Similarly, Benight, Swift, et al. (1999) found, albeit cross-sectionally, that CSE served as a mediator between three important factors (lost resources, optimism, social support) and psychological distress following Hurricane Opal.

CSE appraisals were also found to be important outside the realm of natural disasters. Solomon and colleagues studied CSE for military combat and found that CSE was negatively correlated with PTSD symptoms and general psychological distress at 1 and 2 years following the Lebanon war (Solomon, Benbenishty, & Mikulincer, 1991; Solomon, Weisenberg, Schwarzwald, & Mikulincer, 1988). Benight et al. (2000), in a study with Oklahoma City bombing survivors, found that CSE was negatively associated with distress and explained an additional 28% of the variance in PTSD symptoms after controlling for threat of death, income, social support, and lost resources.

Thus, the research on CSE and trauma recovery provides a preliminary foundation that indicates self-perceptions of coping capability are related to psychological outcomes. In addition, the reviewed literature on ASR provides support for the possible predictive role of ASR for subsequent PTSD symptoms. Thus for this study we tested the following hypotheses. First, both ASR and acute CSE would explain a significant amount of the variance in acute psychological distress after controlling for relevant demographic variables (Hypothesis I). Second, ASR and Time 2 CSE would explain a significant amount of additional variance in Time 2 outcomes over and above demographic variables and Time 1 distress outcomes (Hypothesis II). Third, series of exploratory stepwise regressions were conducted with demographic variables, ASR, Time 1 CSE levels, and acute distress responses in order to determine which Time 1 variables provided the strongest longitudinal prediction of psychological outcomes at Time 2 (Hypothesis III). This is important for early detection of difficulties for possible intervention. Finally, it was also hypothesized that CSE perceptions would serve as a direct

mediator between ASR and psychological distress at 1 year (Hypothesis IV). As a comparison, we also tested identical mediation models substituting Time 1 distress measures for acute CSE. This comparison provides a relatively strict test as to the strength of acute CSE as a mediator between ASR and subsequent distress. The best theoretical test of these relationships would be a structural equation model. Unfortunately, our sample size precluded such modeling.

**Method**

*Participants*

At Time 1, 50 participants who lived within the affected areas of the fire and floods volunteered to complete a series of psychological questionnaires. All participants were sampled between 3 and 8 weeks after the flood ( $M = 5.46, SD = 1.92$ ). All potential participants who were approached to participate in the study at Time 1 agreed to do so, thus our participation rate was 100%. Approximately 1 year after the date of the flood ( $M = 1$  year and 8 days) 46 of the original participants (90%) completed a series of psychological questionnaires assessing long-term psychological distress. Thus the final  $N$  for all statistical analyses was 46.

*Demographics*

At Time 1, 49% of the sample was female falling to 41% at Time 2. Median income was \$30,000–\$35,000 at both time points (see Table 1 for descriptive statistics

**Table 1.** Descriptive Statistics and Bivariate Correlations Among Study Variables

|                | 1      | 2     | 3              | 4              | 5      | 6      | 7      | 8     | 9     | 10    | 11    |
|----------------|--------|-------|----------------|----------------|--------|--------|--------|-------|-------|-------|-------|
| 1. Age         | 1.000  |       |                |                |        |        |        |       |       |       |       |
| 2. Gender      | -.20   | 1.000 |                |                |        |        |        |       |       |       |       |
| 3. Education   | .17    | -.04  | 1.000          |                |        |        |        |       |       |       |       |
| 4. Income      | .43**  | -.12  | .46**          | 1.000          |        |        |        |       |       |       |       |
| 5. ASR         | -.50** | .29*  | -.17           | -.42**         | 1.000  |        |        |       |       |       |       |
| 6. CSE Time 1  | .36*   | -.33* | -.04           | .14            | -.57** | 1.000  |        |       |       |       |       |
| 7. CSE Time 2  | .27    | -.34* | .05            | .06            | .32*   | .67**  | 1.000  |       |       |       |       |
| 8. IES Time 1  | -.40** | .31*  | -.10           | -.35*          | .76**  | -.68** | -.49** | 1.000 |       |       |       |
| 9. IES Time 2  | -.20   | .13   | -.11           | -.25           | .51**  | -.65** | -.75** | .67** | 1.000 |       |       |
| 10. GSI Time 1 | -.48** | .26   | -.07           | -.35*          | .70**  | -.75** | -.62** | .81** | .77** | 1.000 |       |
| 11. GSI Time 2 | -.48** | .21   | -.09           | -.20           | .48**  | -.63** | -.72** | .65** | .71** | .78** | 1.000 |
| <i>M</i>       | 54.54  | —     | 3 <sup>a</sup> | 7 <sup>a</sup> | 93.26  | 50.46  | 56.82  | 31.35 | 28.98 | 0.79  | 0.62  |
| <i>SD</i>      | 17.40  | —     | 1.10           | 3.67           | 30.65  | 11.34  | 9.69   | 9.29  | 9.62  | 0.64  | 0.77  |
|                | 59     | —     | 4              | 12             | 138    | 45     | 37     | 44    | 44    | 2.80  | 3.38  |

*Note.* Education: 1 = Some high school to 5 = Graduate School; Income: 1 = Under \$5,000 to 13 = Over \$60,000. Gender: Male = 1, Female = 2. ASR = Acute stress response; CSE = Coping self-efficacy; IES = Impact of Event Scale; GSI = Global Severity Index.  
<sup>a</sup>Median.

\* $p < .05$  level (2-tailed). \*\* $p < .01$  level (2-tailed).

for primary study variables). The sample was almost exclusively Caucasian (94%). Mean age was 54 ( $SD = 17$ ; Range = 59). Many of the participants (36%) were retired, with only 49% reporting current employment. The majority of the sample was married or living with a partner (77%). Almost all of the participants (80%) reported owning their home.

#### *Disaster Exposure*

Approximately 60% of the participants reported experiencing some damage due to the disasters. Most of the individuals (74%) did not feel their lives were severely threatened from the fire. However, 16% (seven individuals) reported that their lives were moderately to very threatened by the flood. About one third (34%) of participants reported moderate to severe harm from the combined effect of the disasters, with 24% indicating an injury due to the disasters. Four of the individuals in the sample lost their home to the fire. Slightly less than half (44%) of participants provided assistance to another community member during the fire. Comparatively, 60% indicated they had provided help to someone during the flood. Interestingly, 11 and 13% reported they needed help but did not get it during the fire and flood, respectively. More than half of the sample (51%) indicated that they had experienced moderate to severe desperation during the disasters, and approximately 27% said they were still experiencing moderate to severe desperation at the time of filling out the questionnaires (Time 1). Almost one in five of the sample (18%) indicated that they had seen someone die or dead as a result of the flood. However, no one in the sample lost a loved one in the fire or flood. Slightly over half of the sample (51%) indicated they were very concerned about the possibility of another flash flood hitting the community. Finally, 11% reported that they had received some counseling at the time of the first assessment.

#### *Measures*

##### *Stanford Acute Stress Reaction Questionnaire (SASRQ)*

ASR levels were measured using an early version of the SASRQ at Time 1 (Spiegel & Cardena, 1991). To avoid confusion surrounding the timing of the assessment, participants were asked to judge immediate responses *during* the disasters, including: dissociation (e.g., “Felt disconnected from body or body distorted”), emotional reactions (e.g., “Helpless”), and physical responses (e.g., “Rapid heart beat”). This measure was utilized for both the fire and flood. The internal reliability estimates for the fire and the flood were .93 and .90, respectively. Participants

answered the 30 items for both the fire and the flood based on the degree of ASR (0 = *Don't Know/Don't Remember* to 4 = *An Extreme Amount*). Adding the two measures together generated a total ASR score.

##### *Natural Disaster Coping Self-Efficacy Scale (NDCSE)*

This measure was an adaptation of the Hurricane Coping Self-Efficacy Measure (Benight, Ironson, & Durham, 1999) and was used to assess CSE at Time 1 and Time 2. Items that read “caused by the Hurricane” in the first measure were changed to “caused by the fire and floods.” Three items were added that related specifically to the flood and fire context of the disaster. Sample items include: “Dealing with the demands of clearing debris (downed trees, mud, etc.)” “Maintaining a sense of normality in my daily routine,” “Dealing with all the disruption caused by the fire and floods.” Respondents chose from a 7-point scale ranging from 1 (*not at all capable*) to 7 (*totally capable*) to answer the 10 items. Reliability analysis of the 10 items yielded a coefficient alpha of .92. Test-retest reliability over a 1-year time was  $r = .69$ .

##### *Brief Symptom Inventory*

The Brief Symptom Inventory, a condensed version of the SCL-90R, was utilized at both time points (Derogatis & Melisaratos, 1983). This 53-item measure asks participants to ascertain the level of distress related to a series of symptoms with the following anchors 1 (*No discomfort*) to 5 (*Extreme discomfort*). The BSI has shown adequate sensitivity, convergent validity, and reliability (Derogatis & Melisaratos, 1983). The questions relate to the past week and are averaged to give a global psychological distress score called the Global Severity Index (GSI).

##### *Impact of Event Scale (IES)*

The Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) was given at both time points. This is a 15-item scale that assesses the emotional impact of a traumatic event on a person by looking at intrusive thoughts, emotional numbing, and avoidance. Respondents answer items related to the frequency of each symptom experienced from 1 (*not at all*) to 4 (*often*). This scale has shown adequate reliability and validity and is extensively used in trauma research (Horowitz, Field, & Classen, 1993).

##### *Demographic Assessment*

Participants responded to a short 13-item questionnaire that included basic demographics of the individual.

For example, age, gender, education level, current income, religious preference, marital status were included.

### Procedure

#### Time 1

The postdisaster environment was extremely chaotic in the area during the first month following the flood. Phones were out of service for 2 months, water service was unavailable for 1 month, and transportation within the community was extremely limited. Because of the vulnerable nature of the community, we decided to work through the local crisis committee in order to secure community-wide cooperation. We were advised to approach volunteers at a community crisis meeting at the local church 2 weeks following the flood. This approach worked extremely well in gaining trust within the community and increasing our potential sample size (we eventually obtained 50% of the entire community), but did not provide an opportunity to gather a random sample of residents.

The principal investigator briefed residents about the study. Written consent was obtained from all participants. Participants were interviewed in their homes by the principal investigator (licensed psychologist) for all but three interviews that were completed by research assistants. All participants were sampled between 3 and 8 weeks after the flood ( $M = 5.46$ ,  $SD = 1.92$ ). The procedure included: (a) expressing to the experimenter what happened during the fire and the flood while having their blood pressure measured and (b) completing a questionnaire packet. Participants were paid \$20.

#### Time 2

Approximately 1 year after the disasters, participants completed a second set of questionnaire packets which were picked up at participants' homes or mailed to the university ( $M = 1$  year and 8 days). This flexibility was provided to participants to make it easier for them to complete the information in a manner that was convenient to them. The vast majority of the participants' questionnaires were picked up at their homes. Finally, participants were paid \$20 and debriefed.

### Results

Means, standard deviations, and bivariate correlations for the study variables are presented in Table 1. The mean IES score of 31.35 (possible scores from 15 to 45)

and GSI of .78 (possible scores from 0 to 1.5) for this nonclinical sample suggests this sample was experiencing significant distress. The IES mean is comparable to those reported by Israeli soldiers with PTSD following the Lebanon war ( $M = 35.1$ ), and much higher than a sample of medical students ( $M = 9.8$ ; Horowitz et al., 1979; Solomon et al., 1989). For the GSI, the mean value for a nonclinical sample of adults is .31 and 1.26 for a general outpatient psychiatric sample (Derogotis, 1983). By Time 2, these values had dropped slightly, but were still significantly elevated compared to nonclinical populations (IES  $M = 29.98$ ; GSI  $M = .62$ ).

Hypothesis I tested whether ASR and acute CSE would explain a significant amount of the variance in acute psychological distress after controlling for relevant demographic variables. A hierarchical regression was conducted by first entering age and gender followed by ASR and then acute CSE perceptions for all of the Time 1 psychological outcomes (see Table 2). Results confirmed that ASR explained a significant amount of the variance over and above demographic variables for IES

**Table 2.** Hierarchical Regressions With Age, Gender, ASR, and Time 1 CSE Predicting Acute Psychological Outcomes for Time 1

| Variable                     | <i>B</i> | <i>SE B</i> | $\beta$ |
|------------------------------|----------|-------------|---------|
| Outcome variable: IES Time 1 |          |             |         |
| Step 1                       |          |             |         |
| Age                          | -0.19    | 0.07        | -.35*   |
| Gender                       | 4.57     | 2.57        | .25     |
| Step 2                       |          |             |         |
| Age                          | -0.01    | 0.06        | -.02    |
| Gender                       | 1.88     | 1.94        | .10     |
| ASR                          | 0.22     | 0.04        | .72**   |
| Step 3                       |          |             |         |
| Age                          | 0.01     | 0.06        | .01     |
| Gender                       | 0.68     | 1.79        | .04     |
| ASR                          | 0.17     | 0.04        | .55**   |
| CSE Time 1                   | -0.30    | 0.09        | -.36**  |
| Outcome variable: GSI Time 1 |          |             |         |
| Step 1                       |          |             |         |
| Age                          | -0.02    | 0.01        | -.44**  |
| Gender                       | 0.22     | 0.17        | .17     |
| Step 2                       |          |             |         |
| Age                          | 0.00     | 0.01        | -.16    |
| Gender                       | 0.06     | 0.15        | .05     |
| ASR                          | 0.01     | 0.00        | .60**   |
| Step 3                       |          |             |         |
| Age                          | -0.00    | 0.00        | -.12    |
| Gender                       | -0.06    | 0.12        | -.05    |
| ASR                          | 0.00     | 0.00        | .36**   |
| CSE Time 1                   | -0.03    | 0.01        | -.51**  |

Note.  $R^2 = .22$  for Step 1;  $\Delta R^2 = .37$  for Step 2; and .08 for Step 3 ( $ps < .05$ ). The sample size necessary for determining a partial correlation of .05 for these analyses was 30 for IES and 32 for GSI (Milton, 1986). Controlling for experimenter-wise error rates the necessary  $p$ -value for each group of analyses with a Bonferroni correction (.05/2) equals .03. \* $p < .05$ . \*\* $p < .01$ .

Time 1 ( $\Delta R^2 = .37$ ). In addition, acute CSE perceptions also explained a significant proportion of the variance for IES over and above the demographic variables and ASR ( $\Delta R^2 = .08$ ). For the GSI, ASR contributed significantly over and above age and gender adding 26% of the variance. Likewise, acute CSE perceptions also added over and above demographic factors and ASR for the GSI ( $\Delta R^2 = .17$ ).

Hypothesis II assessed whether ASR and Time 2 CSE would explain a significant amount of additional variance in Time 2 outcomes over and above demographic variables and Time 1 distress outcomes. Table 3 depicts the results of hierarchical regression analyses conducted on both of the Time 2 outcomes entering age, gender, and Time 1 distress variables, followed by ASR, then entering Time 2 CSE perceptions. Gender was a significant predictor of Time 2 PTSD symptoms suggesting a greater number of

**Table 3.** Hierarchical Regressions With Demographic, Time 1 Outcomes, ASR, and Time 2 CSE Predicting Time 2 Psychological Outcomes

| Variable                     | <i>B</i> | <i>SE B</i> | $\beta$ |
|------------------------------|----------|-------------|---------|
| Outcome variable: IES Time 2 |          |             |         |
| Step 1                       |          |             |         |
| Age                          | 0.05     | 0.07        | .08     |
| Gender                       | -1.25    | 2.36        | -.06    |
| IES Time 1                   | 0.76     | 0.13        | .73**   |
| Step 2                       |          |             |         |
| Age                          | 0.05     | 0.07        | .10     |
| Gender                       | -1.28    | 2.39        | -.07    |
| IES Time 1                   | 0.73     | 0.19        | .70**   |
| ASR                          | 0.01     | 0.06        | .05     |
| Step 3                       |          |             |         |
| Age                          | 0.09     | 0.05        | .16     |
| Gender                       | -3.79    | 1.75        | -.19*   |
| IES Time 1                   | 0.39     | 0.14        | .37*    |
| ASR                          | 0.05     | 0.04        | .17     |
| CSE Time 2                   | -0.62    | 0.10        | -.62**  |
| Outcome variable: GSI Time 2 |          |             |         |
| Step 1                       |          |             |         |
| Age                          | -0.01    | 0.01        | -.13    |
| Gender                       | -0.01    | 0.16        | -.01    |
| GSI Time 1                   | 0.87     | 0.13        | .72**   |
| Step 2                       |          |             |         |
| Age                          | -0.01    | 0.01        | -.18    |
| Gender                       | 0.02     | 0.16        | .01     |
| GSI Time 1                   | 1.01     | 0.16        | .84**   |
| ASR                          | -0.00    | 0.00        | -.20    |
| Step 3                       |          |             |         |
| Age                          | -0.01    | 0.00        | -.18    |
| Gender                       | -0.12    | 0.14        | -.07    |
| GSI Time 1                   | 0.64     | 0.18        | .54**   |
| ASR                          | -0.00    | 0.00        | -.09    |
| CSE Time 2                   | -0.03    | 0.01        | -.39**  |

*Note.* The sample size necessary for determining a partial correlation of .05 for these analyses was 28 for IES and 29 for GSI (Milton, 1986). Controlling for experimenter-wise error rates the necessary *p*-value for each group of analyses with a Bonferroni correction (.05/2) equals .03. \**p* < .05. \*\**p* < .01.

symptoms reported by women. ASR was not found to be a significant predictor in any of the regression models. In contrast, Time 2 CSE was found to be a significant predictor over and above the other factors in all of the models, with  $\Delta R^2$ s of 8% of the variance for the GSI to 27% of the variance in IES Time 2 scores. As expected, Time 1 psychological distress variables were significant predictors in the final equations for the Time 2 outcomes.

Hypothesis III tested the longitudinal explanatory power of ASR, Time 1 CSE levels, and acute distress responses in explaining psychological outcomes at Time 2. A series of forward stepwise regressions were performed with age, gender, Time 1 psychological outcomes, ASR, and Time 1 CSE included. These analyses provide some evidence as to whether ASR and acute CSE are influencing 1-year outcomes directly or through their influence on Time 1 psychological outcomes.<sup>3</sup> Results showed that Time 1 CSE was a significant predictor for the IES ( $\beta = -.36$ ,  $p < .05$ ) adding 7% of explained variance over and above Time 1 IES. The only significant predictor for the GSI at Time 2 was the GSI at Time 1 ( $\beta = .74$ ,  $p < .001$ ) explaining 63% of the variance. Thus, Time 1 CSE was more important in predicting PTSD symptoms than general distress at Time 2.

Mediation models were used to test the additional hypothesis that CSE would serve as an important mediator between ASR and subsequent distress levels. Hierarchical multiple regression equations were used to construct all mediational models. The following steps must be established to demonstrate a mediational model: (a) a significant correlation between the predictor variable and the criterion, (b) significant correlations between the mediator and both the predictor and criterion variables, and (c) a reduction of the relationship between the predictor and criterion to nonsignificance when the mediator is included (Baron & Kenny, 1986). The strongest test of mediation is when the pathway from the predictor to the outcome variable is reduced to zero (Baron & Kenny, 1986). This finding suggests the presence of a single dominant mediator. If the relationship between the predictor and the outcome becomes nonsignificant, yet the value is different than zero, this suggests the possibility of multiple mediators. To test the importance of CSE as a mediator, we constructed mediational models with CSE as the mediator and comparative models with Time 1 distress measures as the mediator.

The first and second steps of the mediational model were satisfied by the significant correlations between ASR,

<sup>3</sup>A structural equation model with all variables included would be the best test of this hypothesis. Unfortunately, the limited sample size precluded such analyses.

**Table 4.** Mediation Model Analyses With Acute Stress Response as the Predictor Variable, CSE or Time 1 Distress as the Mediator, and Psychological Distress as Outcome Variable

| Variable                  | $\beta_1$ | $\beta_2$ | $\Delta R^2$       |
|---------------------------|-----------|-----------|--------------------|
| Mediator: Time 1 CSE      |           |           |                    |
| IES Time 1                | .51**     | .20       | .20** <sup>a</sup> |
| GSI Time 1                | .48**     | .08       | .18** <sup>a</sup> |
| Mediator: Time 1 Distress |           |           |                    |
| IES Time 2                | .51**     | -.01      | .20** <sup>b</sup> |
| GSI Time 2                | .48**     | -.13      | .39** <sup>b</sup> |

Note.  $\beta_1$  = Standardized regression coefficient between ASR and outcome variable before mediator entered as mediator.  $\beta_2$  = Regression coefficient between ASR and outcome variable after mediator is entered. The sample size necessary for determining a partial correlation of .05 for these analyses was 45 for IES and 47 for GSI with the CSE mediation and 45 for IES and 32 for the GSI with distress mediation. Controlling for experimenter-wise error rates the necessary  $p$ -value for each group of analyses with a Bonferroni correction (.05/4) equals .01 (Milton, 1986).

<sup>a</sup>  $\Delta R^2$  CSE.

<sup>b</sup>  $\Delta R^2$  Distress.

\*\*  $p < .01$ .

Time 1 CSE, and the Time 2 outcome variables (see Table 1). CSE mediated the relationship between ASR and both 1-year psychological outcomes (see Table 4). Time 1 distress measures also significantly mediated between ASR and the Time 2 outcomes. The addition of Time 1 CSE or Time 1 distress reduced the relationship between ASR and the Time 2 outcome variables to nonsignificance. Time 1 distress variables demonstrated stronger mediation than CSE perceptions for both PTSD symptoms and general distress.

## Discussion

Results from this study suggest that ASR and Time 1 CSE are important cross-sectional predictors of distress shortly after the disasters (between 2 and 8 weeks). A year later, Time 1 distress and Time 2 CSE perceptions emerge as consistent predictors of subsequent PTSD symptoms and general distress levels. Gender was a significant predictor only for Time 2 PTSD symptoms, with women reporting more symptoms. Neither age nor gender was significant for any of the other outcomes after taking into account the other factors. The best predictor of Time 2 outcomes appears to be Time 1 distress levels. However, Time 1 CSE does emerge as significant for PTSD symptoms measured at 1 year. ASR does not show relationship with Time 2 outcomes when Time 1 distress and Time 1 CSE are included in the models. Finally, the findings for the mediation analyses demonstrate that Time 1 CSE and Time 1 distress are both strong

mediators between ASR and distress outcomes at Time 2.

Collectively, the findings indicate that shortly after a trauma an individual's retrospective ASR and perceived CSE perception will be strongly related to their psychological outcomes at that time. This finding is consistent with previous research on both ASR (Marmar, Weiss, Metzler, Ronfeldt, et al., 1996; Ursano et al., 1999) and CSE (Benight et al., 1997, 2000; Benight, Swift, et al., 1999). In addition, CSE levels taken a year later should also be strongly related to outcomes also measured at 1 year. This has potentially important implications for psychological interventions with disaster victims in that CSE perceptions are directly tied to environmental demands and may provide useful intervention targets.

Longitudinally, the ASR findings are not consistent with some previous studies that have shown a relationship between ASR and subsequent psychological outcomes (Koopman, Classen, Cardena, & Spiegel, 1995; Shalev et al., 1996), yet are consistent with Freedman et al.'s findings (Freedman et al., 1999). In the Shalev et al. study, dissociation during the trauma remained a significant predictor of 6 month PTSD diagnostic status and symptom intensity after controlling for age, education, gender, event severity, immediate response, 1 week IES scores, state and trait anxiety scores, and depression levels. Interestingly, the Freedman et al. study also found dissociation during the trauma to be a significant predictor for 4-month PTSD status, but not for 1-year PTSD diagnosis. It is conceivable that as more time passes from the original trauma, other intervening, and most likely more important, factors emerge that influence PTSD symptom levels (e.g., ongoing depression levels, CSE perceptions, actual coping strategies, etc.). The lack of findings for ASR in the present study could also be due to the homogeneous and nonclinical nature of the sample. Future research is necessary to ascertain the factors that are perhaps more critical than ASR in explaining more chronic outcomes.

Longitudinally, the most powerful and consistent predictor of Time 2 distress was Time 1 distress. This finding is relatively consistent across the literature with early PTSD symptoms predicting subsequent PTSD levels (Brewin, Andrews, Rose, & Kirk, 1999; Bryant & Harvey, 1998; Classen, Koopman, Hales, & Spiegel, 1998; Harvey & Bryant, 1998; Koopman et al., 1995; Staab, Grieger, Fullerton, & Ursano, 1996). Indeed, this has been the driving rationale behind the inclusion of Acute Stress Disorder within the *DSM-IV*.

Time 1 CSE levels did demonstrate a significant relationship with PTSD symptoms even after controlling for Time 1 PTSD symptoms, age, gender, and ASR. This

suggests that ASR's influence on subsequent distress is most likely funneling through Time 1 distress outcomes and possibly Time 1 CSE perceptions. This finding was further confirmed by the mediational analyses. These analyses also suggest that acute CSE may have a direct effect outside acute distress levels on subsequent outcomes for PTSD symptoms. This finding is consistent with Benight, Ironson, et al.'s structural model where acute CSE and acute distress were found to have significant paths to subsequent distress levels after including several relevant factors (Benight, Ironson, Klebe, et al., 1999). Acute CSE demonstrated paths through acute distress and directly to subsequent distress levels.

Thus, these findings suggest that CSE perceptions taken shortly after a trauma may provide one key mechanism by which ASR develops into PTSD symptom reporting. The magnitude of the ASR during a trauma promotes subsequent levels of intrusive thoughts and avoidant behaviors (Koopman et al., 1995; Shalev et al., 1996). To adapt to postdisaster recovery demands, we would argue that individuals utilize self-evaluative mechanisms generating CSE perceptions. Indeed, CSE perceptions measured during recovery from a severe trauma may actually be more critical in predicting outcomes than during "normal stress." Disasters force individuals to solve immediate problems they most likely have never encountered (e.g., finding water, repairing or rebuilding homes, intrusive thoughts of the trauma). Perceived capability to manage recovery demands in addition to PTSD symptoms become pivotal due to the immediacy of the problems (i.e., primary demands and their resolution). Intrusive thoughts, ineffective coping, and very difficult environmental conditions can drive down CSE perceptions increasing emotional distress. In turn, lower CSE perceptions can impair actual coping behaviors by reducing perseverance and effective strategy adoption (Bandura, 1997). This process may become a vicious cycle with increasing psychological distress and downward spiraling CSE perceptions.

Confirmation of the importance of CSE perceptions both theoretically as well as clinically awaits replication with more diverse samples. Additionally, future research that directly intervenes with CSE perceptions postdisaster would also provide information to help support or refute these findings.

The present mediational and longitudinal regression findings, however, are further supported by studies that have experimentally manipulated CSE to test causative power of CSE on psychological outcomes. These studies have shown direct relationships between strengthening CSE beliefs and subsequent reduction in reported distress levels (Bandura, 1997).

### *Study Limitations*

This was not a randomly selected sample. This relatively small convenience sample was homogenous in age, marital status, and socioeconomic status. Thus extrapolation of these data is restricted. Another limitation of the study is the different procedure utilized between Time 1 (participants interviewed in their homes) and Time 2 (participants having the option to mail their questionnaires to the university or complete it for pickup at their home) may have influenced responses to the questionnaires. However, the majority of the participants completed the information at their homes at both Time 1 and Time 2 where they were picked up. Another limitation is the small sample size which resulted in relatively low statistical power.

A further limitation for this investigation is the ambiguity resulting from the bidirectional relationship between ASR and CSE. These two variables were assessed simultaneously making causal interpretations impossible. However, ASR was a significant predictor of Time 2 CSE judgements ( $r = -.39, p = .01$ ). Further clarification of this issue awaits future research. Finally, it should be noted that the previous research on ASR and subsequent distress was conducted primarily with clinical populations diagnosed with PTSD or clinical depression. This study did not utilize a clinical sample. Thus, speculation of CSE's role in the mediation between ASR and the development of diagnosable PTSD or other psychiatric disorders is limited. Future research with clinical samples is needed to test the importance of CSE's mediational importance between ASR and subsequent clinical diagnoses.

### *Clinical Implications*

These findings may have implications for disaster interventions. Bandura (1997) states that CSE perceptions can be influenced by (a) mastery experiences, (b) vicarious modeling, (c) verbal persuasion, and (d) physiological reactivity. Acute interventions that interrupt the negative self-evaluative cycle utilizing a combination of these factors may be valuable. There are several points of possible intervention including individual counseling, group debriefings, and pharmacotherapy.

Interventions incorporating cognitive behavioral techniques specifically tied to CSE perceptions (e.g., goal setting, cognitive restructuring, reward systems) could be designed to help affected people increase their mastery experiences in dealing with logistical nightmares, material losses, emotional distress, and other major recovery challenges. Promotion of mastery experiences for specific environmental demands in combination with verbal persuasion (i.e., validation and support) could help

individuals to navigate the posttrauma environment creating a sense of accomplishment rather than overwhelming defeat (Bandura, 1997).

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