

A Prospective Study of Depression and Posttraumatic Stress Symptoms After a Natural Disaster: The 1989 Loma Prieta Earthquake

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Measures of emotional health and styles of responding to negative moods were obtained for 137 students 14 days before the Loma Prieta earthquake. A follow-up was done 10 days and again 7 weeks after the earthquake to test predictions about which of the students would show the most enduring symptoms of depression and posttraumatic stress. Regression analyses showed that students who, before the earthquake, already had elevated levels of depression and stress symptoms and a ruminative style of responding to their symptoms had more depression and stress symptoms for both follow-ups. Students who were exposed to more dangerous or difficult circumstances because of the earthquake also had elevated symptom levels 10 days after the earthquake. Similarly, students who, during the 10 days after the earthquake, had more ruminations about the earthquake were still more likely to have high levels of depressive and stress symptoms 7 weeks after the earthquake.

We have long known that people exposed to uncontrollable events often experience psychological distress (cf. Freud, Ferenczi, Abraham, Simmel, & Jones, 1921). Trauma-related psychological disturbances have been documented in victims of environmental disasters (Lindemann, 1944), concentration camp survivors (Davidson, 1967), combat veterans (Grinker & Spiegel, 1945; Sonnenberg, Blank, & Talbott, 1985), and rape survivors (Burnam et al., 1988). Typical symptoms experienced by these victims include depression, anxiety, guilt, impaired concentration, anhedonia, and sleep disturbances.

Although most trauma victims may experience these symptoms to at least a mild degree, there are substantial individual differences in psychological reactions to trauma (Burnam et al., 1988). What makes some people more vulnerable to long-term emotional disturbance after traumas than others? Because most traumas cannot be anticipated, our knowledge of vulnerability factors comes largely from retrospective studies. We report here a prospective study of people's emotional reactions to a recent natural disaster: the earthquake that occurred on October 17, 1989, on the Loma Prieta section of the San Andreas Fault in the greater San Francisco Bay Area. This was the largest earthquake in the Bay Area since 1906 and measured 7.1 on the Richter scale. In the Bay Area, 62 people were killed, 3,757 were injured, and 12,000 were left homeless (U.S. Geological Survey, 1989). Over 18,000 homes and 2,575 businesses were damaged. For days, the local and national news media played and replayed horrifying scenes of damage caused by the earthquake: In the city of Oakland, the upper deck of a major highway collapsed onto the lower deck, crushing and killing people. A fire in the Marina district of San Francisco raged for hours. A

section of the Bay Bridge, the major link between San Francisco and the East Bay, collapsed, rendering the bridge unusable.

Fortuitously, 14 days before the earthquake, we had assessed a group of Stanford University students on two variables that may affect reactions to trauma. Shortly after the earthquake, we reassessed these people's emotional health, how they tried to cope with the earthquake, their ruminations about the earthquake, and the amount of stress they encountered because of the earthquake. Then we again assessed emotional health in a subset of these subjects 7 weeks after the earthquake. Below, we describe previous studies leading to our predictions about who would show the most severe, long-lasting psychological distress after the Loma Prieta earthquake.

Predictors of Reactions to Trauma

Retrospective studies suggest that people's reactions to traumas may be related to the severity of the trauma and the individuals' pretrauma psychological health. Vietnam war veterans (Yager, Laufer, & Gallops, 1984) and rape victims (Peters, 1988) who were exposed to more severe, long-lasting trauma show particularly great risk for psychological disturbance after the trauma. In addition, people who are experiencing negative emotional states before a trauma may be at increased risk for severe, long-term disturbance after the trauma, perhaps because they experience a trauma as more stressful and are less able to cope with the aftermath of a trauma (Lazarus & Folkman, 1984; Yager et al., 1984). In the current study, we tested the predictions that subjects who had greater negative moods before the Loma Prieta earthquake and who were exposed to more stressful circumstances during the days surrounding the earthquake would show more distress after the earthquake.

A third variable that may predict people's emotional health after a trauma is their style of responding to, or coping with, their own symptoms of distress. Nolen-Hoeksema (1987, 1990) has argued that people who tend to focus on their depressive symptoms and ruminate on the causes and implications of

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these symptoms have longer periods of depression than people who take action to distract themselves. Ruminative response styles may prolong depression by enhancing the effects of negative mood on cognition and by interfering with instrumental behavior. Laboratory and field studies have supported these predictions (Morrow & Nolen-Hoeksema, 1990; Needles & Abramson, 1990; Nolen-Hoeksema, Morrow, & Fredrickson, 1990; Wood, Saltzberg, Neale, Stone, & Rachmiel, 1990). For example, in an experimental manipulation of responses to depression, Morrow and Nolen-Hoeksema (1990) found that subjects made to engage in an active, distracting task for 10 min showed complete relief from an induced depressed mood, whereas those made to engage in a passive, ruminative task showed no relief from their depressed mood. In a recent field study of how people respond to their daily experiences of depressed mood, subjects kept track of their moods and how they responded to these moods every day for 30 days (Nolen-Hoeksema et al., 1990). Subjects who ruminated in response to their depressed moods early in an episode mood remained depressed longer than those who did not. In addition, the ruminative response style did not seem to be merely a symptom of depressed mood. Even when subjects' initial levels of depressed mood were controlled for, their styles of responding still predicted the duration of their depressive episodes. Finally, there was evidence that most subjects had a style of responding to mood: Over the month of the study, 83% of the subjects were consistent in the responses to mood they endorsed.

In the present study, we predicted that people with more ruminative response styles would show longer and more severe periods of depression after the earthquake than those with more distracting, mastery-oriented response styles.

Method

Subjects and Procedures

Fourteen days before the earthquake, 250 undergraduates enrolled in a general psychology course completed measures of depression and response styles for depression as part of a larger packet of questionnaires in return for course credit. Of this sample, 137 subjects (70 men and 67 women) completed a second packet of questionnaires 10 days after the October 17 earthquake, again for course credit.¹ Comparisons of the students from the original sample who completed the postearthquake questionnaire and those who did not revealed no significant differences on measures obtained before the earthquake. Finally, 41 (20 men and 21 women) of the students completed a final packet of questionnaires 7 weeks after the earthquake, again for course credit. Comparisons of students who completed the final questionnaires and those who did not revealed no significant differences on any of the measures obtained before or 10 days after the earthquake. However, this does not rule out the possibility that the two groups differed on variables not measured in this study.

Measures Taken Before the Earthquake

The Interview to Diagnose Depression (IDD; Zimmerman, Coryell, Corenthal, & Wilson, 1986) was used to assess depression. The IDD contains 22 groups of five statements. Each group of statements covers one depressive symptom, and the statements are arranged in order of increasing severity. Respondents are asked to read through each group of statements and then pick one statement in each group that best

describes the way they have been feeling for the past week. Answers on the 22 items are summed to create a total severity score. Zimmerman et al. (1986) tested the psychometric properties of the IDD with 235 psychiatric patients. The internal consistency of the scale was .92. Scores on the IDD correlated at .80 or higher with two other self-report measures of depression (i.e., Beck Depression Inventory and Carroll Rating Scale for Depression) and with the Hamilton Rating Scale for Depression completed by psychiatrists.

The subjects completed the Response Styles Questionnaire (RSQ; adapted from Nolen-Hoeksema et al., 1990). The instructions for this questionnaire read as follows:

People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you never, sometimes, often or always think or do each one when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

The 71 items on the RSQ were grouped, *a priori*, into the Ruminative Responses scale, Distracting Responses scale, Problem-Solving scale, and Dangerous Activities scale. The internal consistencies of the Problem-Solving scale and Dangerous Activities scale were unacceptably low (.68 and .44, respectively), so they were not used in the analyses reported here.²

¹ The number of subjects who completed the first measures (i.e., 250) was so much larger than the number who completed the measures 10 days after the earthquake (i.e., 137) because of the way the general psychology subject pool is run. The first administration of the questionnaires was done as part of a large-scale Questionnaire Day, in which practically all students who take general psychology participate, whereas the second administration of the questionnaires was considered by the students as just one of many individual experiments in which they could choose to participate. In other words, the numbers of subjects at the two administrations of the questionnaire reflect the typical number of subjects experimenters get at the all-class Questionnaire Day and the number they typically get for a study by an individual experimenter. Only 41 of the students were reassessed at 7 weeks postearthquake because we contacted only a random sample of the 137 who initially participated, because of time constraints, and because it was near the end of the quarter and many students said they were too busy to participate in the experiment. Of the students contacted, 62% agreed to participate.

² The Problem-Solving scale includes items describing active responses designed to solve some problem related to one's mood (e.g., "make a plan to overcome a problem"). This scale was included to rule out the hypothesis that people engage in ruminative responses in an attempt to solve problems associated with their moods, so the tendency to ruminate should be correlated with the tendency to engage in active problem solving in response to depressed moods. The correlation between the Problem-Solving scale and the Ruminative Responses scale, however, was .04 (*ns*). In contrast, the correlation between the Distracting Responses scale and the Problem-Solving scale was .51 ($p < .0001$), suggesting that people who engage in active, adaptive distractions also tend to take an efficacious, problem-solving approach to moods. The Dangerous Activities scale included items describing reckless or dangerous responses to mood (e.g., "take recreational drugs," "drive recklessly"). It was included to test the hypothesis that people who engage in distracting responses to their moods are prone to using dangerous or reckless means of distracting themselves. The correlation between the Dangerous Activities scale and the Distracting Activities scale, however, was .05 (*ns*). In contrast, the Dangerous Activities scale was positively correlated with the Ruminative Responses scale ($r = .36, p < .0001$), suggesting that people who ruminate when they feel depressed are prone to engage in reckless activities.

The Ruminative Responses scale includes 22 items describing responses to depressed mood that are focused on self (e.g., "I think back to other times I have been depressed"), focused on symptoms (e.g., "I think about how hard it is to concentrate"), or focused on the possible consequences and causes of their mood (e.g., "I go away by myself and think about why I feel this way"). The internal consistency of this scale (Cronbach's alpha) was .89. Subjects' responses to this scale have been shown to correlate significantly ($r = .62$) with their use of ruminative responses to depressed mood in a 30-day diary study (Nolen-Hoeksema et al., 1990).

The Distracting Responses scale includes 13 items describing active, distracting responses to depression that are not dangerous or reckless (e.g., "I do something fun with a friend," "I go to a favorite place to get my mind off my feelings," "I talk with friends about something other than how I am feeling"). The internal consistency of this scale was .80. Scores on this scale correlated significantly ($r = .61$) with subjects' use of distracting responses to depressed mood in our 30-day diary study (Nolen-Hoeksema et al., 1990). Additional evidence for the validity of the RSQ comes from a laboratory study of subjects' choices of activities while in a depressed mood (Butler & Nolen-Hoeksema, 1990). A month before the laboratory experiment, subjects completed the RSQ. Then, in the experiment, they first read a story that induced a sad mood in them. (A cover story convinced subjects that the story they read was part of an experiment on imagination and cognition and that all phases of the experiment represented independent, unrelated experiments.) While the subjects were in a sad mood, they were given their choice of two tasks to work on, ostensibly as part of a new experiment. One of the tasks was described as requiring subjects to focus on their current emotional state, and one of the tasks was described as a study of subjects' geographic knowledge. Subjects who had indicated on the RSQ that they tended to use ruminative responses rather than distracting responses to depressed mood were more likely to choose the emotion-focused task than the other task that had nothing to do with emotion ($p < .01$).

Measures Taken 10 Days After the Earthquake

Depression. Subjects completed the IDD again, 10 days after the earthquake.

Ruminations about the earthquake. The nine items on our ruminations about the earthquake scale asked subjects how much they thought about the experiences they and others had during and shortly after the earthquake (e.g., "thought about the moment the earthquake happened," "thought about the people who were killed," and "thought about what might have happened during the earthquake."). On a scale from 1 (*none*) to 5 (*a great deal*), subjects rated how much they had each of these thoughts the night of the earthquake, the 2 days following the earthquake, and on the 9th and 10th days after the earthquake (i.e., the 2 days before completing the questionnaire). The internal consistencies of the ruminations about the earthquake scale for these three rating periods were .81, .81, and .78, respectively (Cronbach's alpha coefficients). Because these three scores were highly intercorrelated ($r_s = .39-.66$, $p_s < .01$) and the ratings were all done retrospectively, we were skeptical that they could be treated as independent measures. Thus, we averaged the three scores to make a single ruminations about the earthquake score.

Coping with the earthquake. Sixteen items described diverse ways subjects may have responded or tried to cope after the earthquake. Using a 1 (*none*) to 5 (*a great deal*) scale, subjects indicated how much they engaged in each behavior separately on the night of the earthquake, in the 2 days after the earthquake, and in the 9th and 10th days after the earthquake. Because we had no a priori groupings for these items, we submitted the 137 subjects' ratings for each period to separate principal-components factor analyses with varimax rotation. A mini-

mum eigenvalue of 1.00 was used for accepting new factors. Only items loading at least .30 were included on a factor. The first two factors were almost identical for each time period. Factor I appeared to tap the extent to which subjects talked about the earthquake and planned for the future. It included the items "talk about the facts of the earthquake," "talk about your feelings," and "plan for the next quake," at all three ratings. It also included the item "tour the campus (to see the damage)" at the third rating. We labeled Factor I *approach coping*. The second factor always included the items "avoided quake-related conversations," and "tried to distract yourself" and at the final rating also included "chose to spend time alone." We labeled Factor II *avoidance coping*. The subjects' scores on approach coping for the three time periods were highly intercorrelated ($r_s = .43-.83$, $p_s < .0001$). Thus, we averaged these three ratings to create a single approach coping score. Similarly, subjects' scores on avoidance coping for the three time periods rated were highly intercorrelated ($r_s = .33-.83$, $p_s < .0001$). Thus, we averaged these three ratings to create a single avoidance coping score. The remaining factors that emerged in the factor analyses will not be analyzed further because the items loading on them changed over time and the factors were not easily interpretable.

Stress from the earthquake. Four questions asked subjects how much damage, injury, or inconvenience they or their family incurred from the earthquake. Subjects made these ratings on scales ranging from 1 (*none*) to 5 (*a great deal*). Subjects rated the question "how much damage did the earthquake cause to the area where you were when the earthquake happened?" This question was intended to tap subjects' experience of damage and destruction at the moment of the earthquake. Some subjects may have been in areas where no damage occurred; others may have been in areas where walls and ceilings cracked and fell. Subjects also rated the question "how much damage did the earthquake cause to your residence here at Stanford?" At Stanford, seven dormitories were closed for the 2 weeks following the earthquake, and three remain closed indefinitely because of major structural damage. The third question asked subjects whether they experienced any stress because family members or friends in the area were injured in the earthquake, their homes were damaged, or they could not be reached. The fourth question asked how much subjects' daily lives had been inconvenienced as a result of the earthquake. Preliminary analyses showed that these four ratings showed very similar relationships to the other variables measured in the study. Thus, we combined these four ratings into an overall stress score in the following manner. For each question on which subjects indicated they had experienced at least a moderate amount of stress (i.e., rated the stress a 3, 4, or 5), they received a score of 1. On each question in which subjects indicated they had experienced little stress (rated the stress a 1 or a 2), they received a score of 0. We chose this method of combining information across the questions rather than simple averaging because it would treat the four types of stress as independent of each other and would provide a conceptually simple index of stress—namely, the number of types of stress subjects faced.³

Measures Taken 7 Weeks After the Earthquake

Subjects completed a third IDD approximately 7 weeks after the earthquake.

Results

Sex Differences

There were no significant sex differences in response styles or depression scores obtained before the earthquake or on any

³ Weighting subjects' scores by how severe each stress was leads to the same pattern of results presented here.

variable measured after the earthquake. Thus, all analyses were conducted by collapsing across sex of subject.

Stresses Faced by the Subjects

The median number of types of stressors subjects reported was 1 (out of a possible total of 4). Forty-nine percent of the subjects reported experiencing none of the four stressors, 28% reported one stressor, 17% reported two stressors, and 7% reported three stressors. The most frequent type of stressor reported was inconvenience to daily life (36% of the subjects), followed by damage to the area they were in when the earthquake happened (20%), damage or injury to family or friends (19%), and damage to their home at Stanford (7%).

Changes in Symptoms, Ruminations, and Coping Over Time

Repeated measures analysis of variance (ANOVA) revealed no evidence of significant change in total depression (IDD) scores from prequake ($M = 9.51$, $SD = 6.37$) to 10 days postquake ($M = 9.95$, $SD = 7.99$), $F(1, 121) = 0.85$, *ns*, or from 10 days postquake to 7 weeks postquake ($M = 9.58$, $SD = 5.96$), $F(1, 40) = 0.64$, *ns*. The range in change in depression scores from prequake to 10 days postquake was large, from an increase of 26 points to a drop of 18 points. Similarly, from 10 days postquake to 7 weeks postquake, the change in depression scores ranged from an increase of 13 points to a decrease of 18 points.

It is plausible, however, that only certain types of symptoms, and not the full depressive syndrome, would increase in many people following a trauma. Specifically, we might expect symptoms associated with posttraumatic stress disorder (PTSD) to increase. We selected out of the IDD those symptoms listed in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R)*; American Psychiatric Association, 1987) as criteria for PTSD: low energy, loss of pleasure, guilt, lowered concentration, decision-making problems, slowed movement, sleeping less or more than usual, restlessness, anxiety, and irritation. We summed subjects' scores across these PTSD items separately for each time the IDD was administered. Repeated measures ANOVA indicated that PTSD symptoms significantly increased from before the quake ($M = 5.19$, $SD = 3.95$) to 10 days after the quake ($M = 5.96$, $SD = 5.28$), $F(1, 121) = 4.67$, $p = .03$. The range in PTSD change scores from prequake to 10 days postquake was from a drop of 10 points to an increase of 15 points (the total possible points on this scale was 44). Although PTSD scores seemed to decrease from 10 days postquake to 7 weeks postquake ($M = 5.09$, $SD = 3.63$), this decrease was not significant, $F(1, 40) = 1.35$, *ns*. PTSD change scores ranged from an increase of 8 points to a decrease of 14 points.

Prospective Analyses: 10 Days After the Earthquake

A regression analysis tested the hypothesis that prequake depression and response styles and the amount of quake-related stress subjects were exposed to would be significant predictors of postquake levels of depression. The dependent variable was 10-day postquake depression. Independent variables were pre-

quake scores on depression and the Ruminative Responses and Distracting Responses scales and how many quake-related stressors subjects were exposed to (stress). A forward entry method was used in all regressions: Independent variables were added to the equation according to the amount of variance explained, with the criterion that they must be significant at $p \leq .05$. Postquake depression was predicted by prequake depression ($\beta = .51$, $p < .0001$), stress ($\beta = .28$, $p < .0001$), ruminative responses ($\beta = .21$, $p < .005$), and distracting responses ($\beta = -.14$, $p = .04$). Together, these variables accounted for 50% of the variance in 10-day depression scores. Thus, subjects who were already more depressed prequake, who had more ruminative and less distracting response styles, and who were exposed to more stress from the quake had elevated levels of depression postquake.

Next, a regression analysis tested whether subjects' prequake response styles and scores on the PTSD subscale of the depression questionnaire, as well as their quake stress, predicted the number of PTSD symptoms they reported in the 10 days after the earthquake. Postquake PTSD symptoms were predicted by prequake PTSD ($\beta = .52$, $p < .0001$), stress ($\beta = .33$, $p < .0001$), and ruminative responses ($\beta = .16$, $p = .03$). Distracting responses scores were marginally significant predictors of postquake PTSD scores ($\beta = -.12$, $p = .078$). Together the variables accounted for 47% of the variance in PTSD symptoms 10 days postquake.

Prospective Analyses: 7 Weeks After the Quake

Two regression analyses tested predictions that subjects' prequake response styles and symptoms (i.e., levels of depression or PTSD) would predict their symptoms 7 weeks after the earthquake. In the first analysis, the dependent variable was depression (IDD) score at 7 weeks. The independent variables were prequake depression, response styles, and quake stress. Subjects who had more ruminative response styles before the quake ($\beta = .38$, $p < .01$) were more depressed 7 weeks after the earthquake. Ruminative responses accounted for 14% of the variance in 7-week depression scores. None of the other variables were significant predictors.

We then tested the power of quake stress and prequake PTSD symptoms and response styles to predict 7-week PTSD symptoms. Only prequake PTSD symptoms predicted 7-week PTSD symptoms ($\beta = .34$, $p < .03$; $r^2 = .11$).

In two other regression equations, we tested the power of measures taken 10 days postquake to predict depression and PTSD symptoms at 7 weeks. In the first equation, depression at 7 weeks was the dependent variable. The independent variables were 10-day postquake depression, ruminations about quake, approach coping, avoidance coping, and stress. Subjects who were more depressed 10 days postquake ($\beta = .39$, $p < .01$) and who ruminated more about the earthquake ($\beta = .33$, $p < .03$) tended to be more depressed 7 weeks postquake. These variables accounted for 27% of the variance in 7-week depression scores.

In the second equation, PTSD symptoms at 7 weeks was the dependent variable, and 10-day postquake PTSD symptoms, ruminations about the quake, approach coping, avoidance coping, and stress were the independent variables. Only the

amount subjects ruminated about the earthquake predicted 7-week PTSD symptoms ($\beta = .35$, $p < .03$; $r^2 = .12$)

Discussion

As predicted, subjects who before the earthquake had a ruminative style of responding to depressed mood were more likely to be depressed 10 days and 7 weeks after the earthquake than subjects with a less ruminative response style. In addition, subjects with ruminative response styles showed higher levels of the symptoms associated with PTSD in the 10 days after the earthquake than those with a less ruminative style. These results obtained even after controlling for subjects' initial levels of depressed mood or PTSD symptoms, suggesting that a ruminative response style is not merely a symptom of negative mood. Rather, ruminative responses to depression, which involve focusing on one's mood and the causes and implications of the mood, may contribute to longer periods of negative mood by enhancing the effects of negative mood on thinking and by reducing instrumental behaviors (Morrow, 1990; Needles & Abramson, 1990).

Many of the students, however, experienced decreases rather than increases in depression and PTSD symptoms following the earthquake. Our results suggest these students had less of a tendency to ruminate and perhaps more of a tendency to distract themselves from their moods. Indeed, for some students who were in a negative mood before the earthquake and were looking for ways of relieving their mood, certain activities after the earthquake (e.g., participating in relief efforts around the Bay Area) may have distracted them from their moods and enhanced their feelings of efficacy.

Analyses of our measure of ruminations about the earthquake also suggested that subjects who often thought about the moment the earthquake happened, their feelings around the time of the earthquake, and the injuries to other people during the first 10 days after the earthquake showed more depression and PTSD symptoms 7 weeks later. We note, however, the important conceptual distinction between subjects' ruminations specifically about the earthquake and a ruminative response style for depression. A ruminative response style is conceived as the tendency to purposely focus on one's moods and the implications of these moods. This response style theoretically should predict the duration of negative moods regardless of whether the mood was the result of a traumatic event. Indeed, in another study of Stanford students not conducted around the time of an earthquake, we showed that subjects with ruminative response styles showed longer periods of depression than those with less ruminative response styles (Nolen-Hoeksema et al., 1990).

Severity of the Trauma

As predicted, the more damage and destruction from the earthquake subjects were exposed to, the more depressive and PTSD symptoms they showed just after the earthquake. Yet, although some subjects reported experiencing severe stressors as a result of the earthquake, nearly half reported no severe stressors. Would the same pattern of results have emerged if more of the subjects had undergone severe stressors? Or would the severity of the stressor overwhelm individual differences?

Furthermore, would our results generalize to victims of different kinds of traumas? One important characteristic of an earthquake is that nearly everyone in a community experiences the event, at least to some degree. This allows people to share their experiences and reactions with others who may have been similarly affected. In contrast, traumas such as rape or the violent death of a loved one happen to individuals or families. Sharing such experiences with others may be difficult because others cannot understand the victims' feelings or because victims fear being ostracized for revealing their trauma. There would also seem to be more opportunity for self-blame in traumas such as these than in a natural disaster. So would people with ruminative response styles show more depression after these types of traumas?

Even for people who undergo horrific traumas, long-term emotional health may be affected by their tendency to assume forward-looking, mastery-oriented approaches to managing their negative moods or to remain focused on the emotional pain they feel as a result of the trauma. In addition, a ruminative response style may be especially pernicious for victims of traumas that they feel they cannot reveal to others. Confiding in others may reduce a person's tendency to ruminate, thereby helping him or her to recover from a trauma (cf. Pennebaker, 1989; Pennebaker & O'Heeron, 1984). When a person is prone to rumination and cannot confide in others about a trauma, he or she may be at particularly high risk for long-term negative reactions to traumas. The relationship between ruminative response styles, as conceived of here, and emotional health after a variety of different traumas remains to be tested, however. Because the response styles theory argues that ruminative responses prolong depression regardless of the source of the depression, we would predict that subjects with ruminative response styles will show longer, more severe depressive reactions to a variety of traumas.

Preexisting Emotional Health

A third predictor of students' levels of depression and post-traumatic stress after the earthquake was their prequake level of symptoms. Students who were already impaired by symptoms before the earthquake may have had fewer personal resources for coping with the inconveniences caused by the earthquake (see also Lazarus & Folkman, 1984). They also may have simply experienced these inconveniences as more stressful and uncontrollable than students who were not already depressed. For example, students who were displaced from their homes by the earthquake had to tolerate camping in the lounges of other dormitories for 2 weeks until permanent accommodations could be found for them. Those who were already depressed before the earthquake may have perceived these inconveniences as more frustrating and demoralizing.

Coping With the Earthquake

The absence of relationships between the Avoidance Coping and Approach Coping scales and the negative mood variables suggests that it neither helped nor hurt to talk with friends about the earthquake. This would seem to contradict Pennebaker's (1989) theory that talking about a trauma can have posi-

tive effects on people's health. The primary outcome measures in Pennebaker's studies, however, are physical health measures, whereas the outcome measures in this study were psychological health measures. Also, Pennebaker's theory focuses on people who may want to talk about a trauma but do not feel the social environment supports this, so they inhibit talking. Yet, especially in the first 10 days following the earthquake, it seemed everyone was talking about the earthquake constantly. Thus, anyone who wanted to talk about it would have had many willing partners. This may be why the approach coping variable, measured in the first 10 days following the earthquake, did not predict outcomes.

Limitations

The primary limitation of this study is that it relied solely on self-report measures. It certainly would have been advantageous to obtain objective assessments, particularly of the students' emotional reactions to the earthquake. Because we could not anticipate the earthquake, however, we had no time to obtain the resources necessary for doing objective assessments of the students' symptoms shortly after the earthquake. Still, the instrument used to assess depression here, the IDD, shows evidence of good validity and reliability (Zimmerman et al., 1986). Thus, although we do not have clinical assessments of the respondents in this study, we believe the assessments of symptomatology we have are informative.

A related limitation of this study is in our measure of post-traumatic stress symptoms. This measure was simply a subset of items from the depression scale and has not been validated. We considered using a preexisting measure of posttraumatic stress symptoms (Zilberg, Weiss, & Horowitz, 1982). We decided against it because most of its items are very similar to measures of earthquake-related ruminations (e.g., "I thought about it when I didn't mean to"), and it does not include the other symptoms of PTSD listed in the *DSM-III-R* (e.g., loss of energy and interest, problems in concentration and decision making). Indeed, we feel that an interesting result from this study is that people's tendencies to recall a trauma (i.e., their ruminations about the earthquake scores) were good predictors of whether they would show the other symptoms of PTSD. Still, we must be cautious about interpreting the results concerning the PTSD scale until they can be replicated with a better validated measure.

In addition, because this is a correlational study, our results can only suggest which factors predicted subjects' symptoms later in the study, but the causal relationship between variables cannot be proven. With regard to response styles, however, the experimental study by Morrow and Nolen-Hoeksema (1990) shows that manipulating responses to depressed mood produces the predicted changes in depressed mood.

Finally, some readers may question why we did not obtain sex differences in response styles and emotional symptoms when the response styles theory was originally introduced to explain sex differences in depression (Nolen-Hoeksema, 1987). We note, however, that one of the few groups in which no sex differences in depression or personality variables are often found is college students (cf. Nolen-Hoeksema, 1990), and ours was a study of college students.

Conclusion

The results of this study suggest that a predictor of how long negative emotions endure is a person's style of responding to these negative emotions. People who tend to focus on their symptoms and the possible causes and implications of them tend to remain symptomatic longer than those who do not. Does this mean people should be encouraged just to forget their feelings and experiences? We want to distinguish between distracting responses to negative mood, as measured in this study, and simple suppression of thoughts and feelings. Distracting responses, which were associated with positive emotional health, involve actively engaging in pleasurable events that can give one a sense of efficacy and take one's mind off a negative mood. In contrast, suppression is akin to ordering oneself not to think about something, without necessarily finding distractors that may help one do this. We would predict that suppression would not help to relieve a negative mood. Indeed, simply trying to suppress negative thoughts and feelings may increase ruminations (Wenzlaff, Wegner, & Roper, 1988) and thereby maintain a negative mood. Engaging in distractions or other activities that decrease ruminations should, however, shorten a negative mood.

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