Flood and Psychological Well-Being: Direct, Mediating, and Moderating Effects

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Recent attention to terrorism and natural disasters has shifted public attention toward understanding how disasters shape our lives and affect our mental health. The major challenge of stress research is to study acute stress using prospective designs that make use of major theoretical models such as the stress process model. Using prospective, representative data (N = 1,735), this study measures the direct, mediating, and moderating impact of the 1993 Midwest floods for three major outcomes typically associated with natural disasters: depression, anxiety, and PTSD. Using the stress process model as a guiding framework, regression analyses revealed that the flood significantly elevated symptoms of depression, anxiety, and posttraumatic stress. Adding social-psychological resources such as social support and sense of control into the equation reduced the impact of the flood on well-being suggesting evidence for a mediating effect. This study also found evidence that social-psychological resources modify the relationship between flood and well-being.

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Disasters provide fertile ground for research on acute stress because they are both unwanted and unscheduled, usually with clear start and stop points.

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This study uses prospective data to assess the impact of a flood on psychological well-being from a representative sample of Iowans. To effectively examine the stress-distress relationship, this paper examines the mediating and moderating role of chronic stress and psychosocial resources within the framework of stress process theory (Pearlin et al. 1981).

Research on natural disasters has grown in the past decade as scholars document how these acute stressors impact outcomes such as depression (Ginexi et al 2000; O’Neill et al. 1999; Rubonis and Bickman 1991; Tyler and Hoyt 2000), marital relationships (Conger et al 1993; Davis and Ender 1999), domestic violence (Clemens and Hietala 1999), social support (Cook and Bickman 1999; Kaniasty and Norris 1993), and feelings or sense of personal control (Smith and Freedy 2000; Solomon, Regier, and Burke 1989). The early work in this area was more descriptive without well-defined concepts and hypotheses, but scholarship has gradually shifted toward understanding the social and psychological underpinnings of these events within advanced theoretical models (Eranen and Liebkind 1993).

Few studies examine disasters from a social context perspective because many researchers assume that disasters are random events and therefore blind to social attributes (Blaikie et al. 1994). However, one’s status can shape the impact of events. Individuals coming from disadvantaged status positions such as the poor, minorities, and women are more vulnerable to disasters (Conger et al. 1993; Erickson 1994; Gleser, Green, and Winget 1981); they are more likely to be exposed to disasters and less able to cope with them. For example, poor people are more likely to live in flood plains, which significantly increase their risk of experiencing flooding (Ginexi et al. 2000). Although everyone is susceptible to disasters, higher status groups are better able to cope, on average, than lower status groups. Their status enables them to find temporary housing, take time off from work, and carry property insurance (Blaikie et al. 1994).

Further evidence of social status differences in life events can be found in several empirical studies. Conger and colleagues (1993) found gender differences in reporting incidence and outcomes of undesirable life events. Men more often reported work and financial difficulties, while women reported more family and relationship problems. Outcomes of the same stressor, such as financial stress, were different as men expressed hostility and women reported somatic complaints. Gleser, Green, and Winget (1981) discovered demographic variation in response to the Buffalo Creek flood. Women were more likely to exhibit internalizing outcomes such as depression and anxiety, while men exhibited externalizing outcomes such as belligerence and alcohol abuse. White survivors displayed more psychopathology than nonwhite sur-
vivors of the flood. Finally, education lessened the impact of the flood only among males. These findings highlight the importance of accounting for social status when measuring life events and support calls for research to incorporate multiple outcomes when possible (Anesehensel 1992; Horwitz, White, and Howell-White 1996).

Most research finds that acute events negatively impact psychological well-being (Norris et al. 2002). Disaster victims are more likely to develop psychological disorders compared to those not exposed to natural disasters (Dohrenwend 2000). Commonly these disorders are depression, anxiety, and post-traumatic stress disorder (Canino et al. 1990). Erikson's (1976, 1994, 1998) pioneering work documented the deleterious mental health effects of natural disaster. His work was the fountainhead of more advanced designs and more theoretically-based research on natural disasters because he linked the psychological effects of disaster to social structure.

Aside from the data used for this study, few studies are able to use prospective, representative samples of disaster victims. In 1984, a survey of mental disorders for Puerto Rico residents was completed. A year later, the island experienced heavy rains that produced severe floods and mudslides. Canino and colleagues (Bravo, Rubio-Stipee, and Canino 1990a, Bravo et al. 1990b; Canino et al. 1990) surveyed people exposed and not exposed to this disaster based on the 1984 sample. In addition, they surveyed several new respondents to collect retrospective data in addition to the prospective data. Their study was able to contrast findings from a cross-sectional and longitudinal design using control subjects. Their results confirm that disasters increase stress-related disorders such as depression, generalized anxiety, and post-traumatic stress disorder. Although their results are significant because of their sample and research design, they included only gender, age, and education as possible confounding variables and measured diagnosed disorders rather than symptoms of distress. Although we can learn much from this study on mental morbidity, many scholars (Holahan and Moos 1994; Kessler, Price, and Wortman 1985; Thoits 1983) argue that we need to include mediating resources in disaster models in order to account for vulnerability factors and to measure symptoms, not disorders (Mirowsky and Ross 2003).

Some studies have incorporated psychosocial resources as mediators for mental health outcomes of disasters. Using data from Hurricane Andrew, Haines, Hurlbert, and Beggs (1996, 1999) explicitly tested the stress process model and found social support moderated the impact of a disaster. Likewise, Kaniasty and Norris (1993) surveyed respondents once before and twice after severe flooding and found that social support mediated the impact of flood exposure on psychological distress. Smith and Freedy (2000) tested a path model of
the effects of flooding in the Midwest. They found that losses in psychosocial resources such as sense of control mediated the impact of flood on psychological distress. The most recent and authoritative work in this area examined depression and flood impact using data from the present study. Ginexi and colleagues (2000) found that the Midwest floods increased depressive symptoms and this effect was particularly felt by those in lower income groups living in small, rural communities. Using the same data, Tyler and Hoyt (2000) charted how support moderates the relationship between flood exposure and distress for older adults. Younger age groups were more insulated from the effects of the flood than older age groups. Conflicting evidence was uncovered in one of the few longitudinal studies of disaster impact. Using cross-sectional data from victims of Hurricane Floyd, Van Willigen (2001) found that social support and sense of purpose in life improved psychological well-being for those impacted by Hurricane Floyd. There was no evidence that sense of control ameliorated the distress brought on by the hurricane. In fact, the coefficient for sense of control was positive, indicating that personal control was associated with increased distress among the victims of the hurricane.

Perceived control is especially important to disaster research because a breakdown in the victim’s belief in a predictable, controllable world is seen as central to the disaster experience (Erickson 1976). Those individuals who maintain their belief in a world in which they can control outcomes are less likely to be affected by a disaster than individuals who never believed they could control outcomes or lost that belief in the disaster (Gibbs 1989). Consequently, diminished sense of control may make one more vulnerable to negative outcomes when faced with new stressors (Thoits 1983).

Pioneering work by Baum and colleagues (Baum, Fleming and Davidson 1983; Baum et al. 1992) suggests that sense of control differs by the type of disaster. Obviously, most disasters are beyond our control, but their research notes a difference between lack of control over disasters never perceived to be controllable and loss of control over disasters which one expects to be controllable. For example, we expect to have control over technology. When an oil spill occurs, that event holds more impact than a tornado, which we would never expect to control.

Consistent with this finding, Solomon and Smith (1994) were able to capitalize on the chance occurrence of a disaster in one of the Epidemiological Catchment Areas. Their study examined the role of social support and perceived control as moderators of response to a disaster. They examined two types of disasters: exposure to dioxin and a flood. Individuals reported more mental health problems with the dioxin exposure compared to the flood. Sense of control was disrupted more by the technological, as opposed to the natural disaster, and therefore sense of control was less effective as a moderator of distress. Another example with contradictory results comes from asbestos
workers whose perceived control was unaffected by a technological disaster. Individuals exposed to asbestos, through their choice of occupation, may have felt more control over their exposure than people accidentally exposed to this contaminant (Lebovits, Bryne, and Strain 1986). Unfortunately, few studies have predisaster measures of perceived control (Gibbs 1989).

Method

Sample

The data used for this study come from two waves of the Iowa Health Poll (IHP) conducted by the Center for Family Research in Rural Mental Health at Iowa State University (Hoyt et al. 1997). This statewide survey interviewed 2,406 adults by telephone in 1992 about their health and mental health needs, service use, stressful life events, and household demographics. After selecting a random sample of households with listed numbers using random digit dialing, households were called and interviews were conducted with an eligible adult. The response rate for this initial wave was 76%. About 64% of the respondents in this sample were women and ages ranged from 18 to 98.

Beginning in the spring and continuing through the summer of 1993, severe storms struck Iowa with rains that persisted for months. The flood was one of the worst in Iowa’s history (Josephson, 1994). Nearly 23,000 homes were damaged, over 10,000 residents were evacuated for safety, and total damages in Iowa ranged from $3 to $7 billion. On July 13, 1993, the entire state of Iowa was declared a Federal disaster area (Thompson, 1994). The second wave of data was collected approximately 60 days after the peak impact of the flooding. About 90% of the original respondents were located, and 82% agreed to participate in the follow up study. This survey asked questions from the original survey and added items to assess the potential impact of the floods. Of the 1,735 respondents in the second wave, 66% were female with ages ranging from 18 to 90. By contacting the same representative sample from the initial interview, these data are one of the few prospective assessments of a natural disaster. For a more complete overview of the sample, see Ginexi and colleagues (2000).

Dependent Variables

Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D, Radloff 1977). Refer to the Appendix A for a detailed list of items used in constructing indices for this paper. Each of the 20 items measures how the respondent felt in the past week. Presence of a symp-
tom ranges from 0 (rarely or none of the time), 1 (1-2 days, some or a little of the time), 2 (3-4 days, occasionally or a moderate amount of time), and 3 (5-7 days, most or all of the time). Four of the 20 items were reverse coded as they indicated states contrary to depression (happy, enjoy life, hopeful, as good as others). These 20 items were added together to create a summary index. Using this procedure resulted in missing data for about 8 percent of the sample. The scale has a possible range of 0 to 60, with a mean score of 7.96 (Time 1) and 7.43 (Time 2), a standard deviation of 8.56 (Time 1) and 8.66 (Time 2), and an alpha reliability coefficient of .89 (Time 1) and .90 (Time 2).

Anxiety was measured only in the second wave of data collection, and was composed of 8 dichotomous items adapted from the SCL-90 (Derogatis 1977). These items were aggregated to create a summary scale that had a possible and actual range of 0 to 8, with a mean score of 1.06, a standard deviation of 1.54, and a reliability coefficient of .73. Posttraumatic stress disorder was assessed only in the second wave of data collection as well. The PTSD Symptom Scale (Foa et al. 1993) consists of 17 dichotomous items that asked respondents to identify the presence or absence of a symptom. This summary scale had a possible range of 0 to 17 and an actual range of 0 to 15, with a mean score of 1.17, a standard deviation of 2.19, and a reliability coefficient of .70.

Independent Variables

To gauge the level of flood impact experienced by respondents, an additive index of 19 items was created based on measures designed in prior disaster research (Smith et al. 1986) ranging from loss of utility services to evacuation. The possible range of scores is 0 to 19, but the observed values of this index ranged from 0 to 14, with a mean score of 1.63, standard deviation of 2.33, and an alpha reliability coefficient of .79. The index was highly skewed, with only 52% of the sample reporting any flood exposure. In fact, less than 2% reported having to vacate their homes, and there were no known fatalities among sample respondents or their families. Given the wide range of exposure and relatively small proportion that experienced severe exposure, respondents were grouped by whether they reported one or more of the exposure items or none of the items (1=flood exposure; 0=no exposure). The results reported in this paper use the additive index because a supplemental analysis using the dichotomous variable did not yield significantly different results.

Sense of personal control refers to the perception that what happens to you in life is the result of your own actions (Mirowsky and Ross 2003). The four categories created by this index (claiming and denying control, good and bad outcomes) each have two statements. Claiming control for good outcomes is measured with (1) “I am responsible for my own successes” and (2)
“I can do just about anything that I really set my mind to;” while claiming control over bad outcomes corresponds with (3) “I am responsible for my failures” and (4) “My misfortunes are the results of mistakes that I have made.” Denying control over good outcomes is indicated with (5) “The really good things that happen to me are mostly luck” and (6) “Most of my problems are due to bad breaks.” Denying control over bad outcomes is associated with the following: (7) “I have little control over the bad things that happen to me” and (8) “There’s no sense planning a lot, if something good is going to happen, it will.” Responses to questions about claiming control (1 through 4) are coded strongly disagree (-2), disagree (-1), neutral (0), agree (1), and strongly agree (2). Responses to questions denying control (5 through 8) are coded strongly disagree (2), disagree (1), neutral (0), agree (-1), and strongly agree (-2). Because this index of personal control is balanced, it has a relatively low alpha score (mean = .82, alpha = .63). Unbalanced measures tend to have inflated reliability scores making estimates for this measure relatively conservative (Mirowsky and Ross 1991, 1996).

Rather than use a general measure of social support, this study uses two measures of flood-specific social support. Research suggests that context specific support measures provide a better understanding about the impact of stress (Cutrona 1986; 1990). Giving flood support was an additive index of four items asking the respondent if others have come to them for advice, comfort, trusted them, or counted on them (M = 2.5, SD = 5.1). Respondents were asked about flood support regardless of their level of flood impact. The alpha reliability for this index was .69. Receiving flood support was also an additive index of four items asking respondents to report their perception of whether there was someone they could trust, get advice, and receive comfort in the event of a conflict (M = 5, SD = 7.1). The scale items had an alpha reliability of .70.

To assess economic hardship, respondents were asked if they experienced any of the following in the previous 12 months: substantial decrease in income, trouble paying bills on time, laid off at work, or needed to use savings to meet expenses. The number of affirmative responses was summed to create a scale with a possible range of 0 to 4 (M = .70, SD = .95). The alpha reliability score for this index is .55. Factor analysis produced strong evidence that these items represent one factor. Nearly 43% of the variance was explained by one factor (eigenvalue = 1.71) compared to 23% for the second (eigenvalue = .90).

Many scholars argue for the need to consider sociodemographic characteristics when studying stress (Aneshensel 1992; Pearlin 1989, 1999), so this analysis incorporates variables consistently associated with mental health outcomes (Kessler, Price & Wortman 1985; Mirowsky and Ross 2003). Gender is a binary variable with males as the reference category (M = .66, SD = .48). Race is a dichotomous measure with nonwhites as the reference category (M = .93,
SD = .25). Age is a continuous measure (M = 52.1, SD = 15.8). Education is an ordinal measure representing the highest degree obtained with a range from 1 to 6 (M = 3.1, SD = 1.5). Income is also coded as an ordinal measure with 10 categories in increments of $5,000 (M = 6, SD = 2.2). Finally, perceived health was added as a measure of physiological stress. Low scores (1) indicate poor health and high scores (5) indicate excellent health (M = 3.62, SD = .99).

Four variables had missing data. About 9% of the data for income, 26% for flood support received and given, and 51% for PTSD were missing. The missing data for income was mostly due to don’t know and refused responses, and flood support and PTSD were mostly due to skip patterns in the survey instrument. The method of handling missing data is based on theory and procedures developed by Little and Rubin (2002) and elaborated on by Allison (2002) and Schaefer (1997). These procedures use all observations in the data to estimate parameters in a model using maximum likelihood (ML). The goal of this estimation procedure is to choose estimates that maximize the probability of observing what has been observed. By adding together the observed probabilities and dividing by all possible values of the missing data, we can obtain the likelihood function (Schaefer 1997). This estimation method is called raw maximum likelihood, or direct ML, and provides efficient estimates with correct standard errors. This procedure has an advantage over other methods, such as the expectation-maximization (EM) algorithm, because it directly maximizes the likelihood for a given model. The EM algorithm indirectly does this by producing estimates of the means, standard deviations, and correlations, which result in standard errors that are biased for the model (Allison 2002). Further analyses using listwise deletion of cases found no significant differences in results, so the results reported here include the full sample using ML estimators (n = 1,735).

Results

Table 1 compares the means between those who were impacted and not impacted by the flood. Significant mean differences were found for gender, race, age, income, economic hardship, social support, and depression. This finding is consistent with past research (Blaikie et al. 1994; Erickson 1994) that found disadvantaged persons are more likely to experience a flood. Perceived health, sense of control, anxiety, and posttraumatic stress symptoms were not significantly different for those impacted by the flood. Those impacted by the flood tended to be younger, female, nonwhite, have higher incomes, and be more depressed. Paradoxically, those impacted by the flood tended to experience significantly more economic hardship, despite higher incomes, receive less social support, and give more social support. The final column of this table provides the means and standard deviation statistics for the entire sample.
Table 2 presents results from the regression of depression on several independent variables. Because this sample is prospective and has a baseline measure of depression, it was possible to assess if levels of depression changed over the two waves due to the flood. In the first column, the flood significantly elevated levels of depression when controlling for socio-demographic characteristics (b = .345, p < .001). This initial regression equation accounted for 33% of the variance around depression which is an improvement in explanatory power from previous studies.

The next step in testing the stress process model is to examine mediating resources. One common method of testing for a mediating relationship is to perform a regression analysis in which potential mediating variables are stepped into the equation. Then, one can compare subsequent changes in the primary variable of interest. If the coefficient for the variable of interest is affected by the introduction of mediating variables, then that provides some evidence that the relationship between the primary variable of interest and the dependent variable is affected by a third variable. As shown in column 2 of Table 2, several variables associated with the stress process model were added into the regression equation. All of the mediating variables were significantly associated with depression, and, overall, contributed about 7% more explained variance around depression. Economic hardship, the chronic stress variable,
and giving social support were positively associated with depression. Physical health, receiving social support, and sense of control were negatively associated with depression. Furthermore, the coefficient for flood impact (b = .174, p < .05) was significantly reduced by adding these variables into the equation, which suggests that the impact of the flood on depression is reduced when accounting for other components of the stress process.

The final analysis step to test the stress process model is to examine potential moderating effects between stressors and resources. Stress process theory states that resources can modify the effect of primary and secondary stressors (Pearlin 1989, 1999). To assess whether the effect of the flood, the primary stressor, depends on psychosocial resources (social support and sense of control), three multiplicative variables were created and entered one at a time into the equation for each dependent variable. The third and fourth columns of Table 2 present the significant interaction terms. Both of the interaction terms have a negative slope which means that for each unit increase in one variable, there is a one unit decrease in the other variable. The effect of the flood on depression was reduced in the presence of support received and sense of control. Sense of control has less of an impact on depression when both stressors equal zero. Put differently, sense of control appears to protect against depression more for those who expe-

<table>
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<tr>
<th>Depression (T1)</th>
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<th>.451***</th>
<th>.475***</th>
<th>.478***</th>
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<td>.494**</td>
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<tr>
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<td>.637**</td>
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<td>-.669**</td>
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<td>.411**</td>
<td>.399*</td>
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<td>-2.393***</td>
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<tr>
<td>Support Received x Flood</td>
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<td>17.115</td>
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<td>.41</td>
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Note: Unstandardized coefficients are shown.
* p < .05, ** p < .01, *** p < .001 (2-tailed tests)
rienced the flood. When sense of control equals zero, which is the midpoint, then the flood had a greater impact on depression. The overall variance around depression does not change substantially for any of these interaction terms.

Table 3 presents the results of the regression analysis when using anxiety as the dependent variable. As in the preceding example, these were tested for main, mediating, and moderating effects. However, unlike depression, anxiety does not have a baseline measure. The main effects for the flood on anxiety are presented in column one of Table 3. The flood is significantly and positively associated with anxiety (b = .073, p < .001) when controlling for socio-demographic characteristics. Overall, 7% of the variance around anxiety was explained in this equation. In the second column, other stress process variables are added which substantially raise the explained variance by 12%. Support given is not significantly associated with anxiety, but the other variables are associated with anxiety in the same direction as the depression analysis. Once again, the coefficient for flood impact (b = .03, p < .05) is reduced by adding these variables into the equation which suggests a mediating relationship.

<table>
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Note: Unstandardized coefficients are shown.
* p < .05, ** p < .01, *** p < .001 (2-tailed tests)

The third column of Table 3 shows the only significant interaction term when using anxiety as the dependent variable. Sense of control produced a significant interaction term with flood impact suggesting that the effect of the flood on depres-
sion is reduced by sense of control. The results are identical to those found when depression is used as the dependent variable. The product coefficient is negative indicating that for each unit increase in flood impact, the effect of personal control on anxiety decreases. Sense of control has less of an impact on anxiety when flood impact equals zero. Put differently, sense of control appears to protect against anxiety more when one experiences a flood. When sense of control equals zero, then the flood has a greater impact on anxiety. Overall, the interaction of sense of control and flood impact accounts for an additional 3% of the variance around anxiety.

Table 4 presents the results of the regression analysis when using posttraumatic stress (PTSD) as the dependent variable. As in the preceding example, cross-sectional effects were tested because PTSD was not measured in the initial survey. The main effects for the flood on PTSD are presented in column one of Table 3. The flood is significantly and positively associated with posttraumatic stress ($b = .357, p < .001$) when controlling for socio-demographic characteristics. Overall, 18% of the variance around PTSD was explained in this equation. Adding the other stress process variables increased the explained variance by only 4% with all of the added variables significantly associated with PTSD in the same direction as the depression and anxiety analyses. Once again, the coefficient for flood impact ($b = .294, p < .001$) is reduced by adding these variables into the equation which suggests a mediating relationship.

<table>
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<td>-.168*</td>
<td>.065</td>
<td>-.181*</td>
<td>-.168*</td>
<td></td>
</tr>
<tr>
<td>Support Given</td>
<td>.315***</td>
<td>.299***</td>
<td>.053</td>
<td>.287***</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>-.446**</td>
<td>-.451**</td>
<td>-.429**</td>
<td>.269</td>
<td></td>
</tr>
<tr>
<td>Support Received x Flood</td>
<td>-0.071**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support Given x Flood</td>
<td></td>
<td>.074***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control x Flood</td>
<td></td>
<td></td>
<td></td>
<td>-.191***</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.252</td>
<td>.719</td>
<td>.185</td>
<td>1.508</td>
<td>.554</td>
</tr>
<tr>
<td>R2</td>
<td>.18</td>
<td>.22</td>
<td>.22</td>
<td>.23</td>
<td>.23</td>
</tr>
</tbody>
</table>

Note: Unstandardized coefficients are shown.
* $p < .05$, ** $p < .01$, *** $p < .001$ (2-tailed tests)
The final three columns in Table 4 show the significant interaction terms when using posttraumatic stress (PTSD) as the dependent variable. All of the interaction terms for depression and anxiety were negative, but when examining PTSD there is a positive coefficient between flood impact and giving social support. The positive slope for the interaction term indicates that for each unit increase in flood impact the effect of giving support on PTSD increases. In other words, giving support enhanced the effect of the flood on PTSD. The other interaction terms presented in columns 3 and 5 are consistent with findings when depression and anxiety are the dependent variable. Both product coefficients are negative indicating that the effects of the flood on PTSD were reduced by support received and sense of control.

Discussion

This study capitalized on prospective, representative data to assess the impact of a flood on three dimensions of psychological well-being. The stress process model (Pearlin et al. 1981) was used as a framework to examine the mediating and moderating roles of chronic stress and psychosocial resources. Experiencing the flood was significantly associated with depression, anxiety, and posttraumatic stress. Adding stress process components such as social support and sense of control reduced the impact of the flood on all three dimensions of well-being. Finally, social-psychological resources further modified the relationship between the flood and well-being. Sense of control was particularly important because it moderated the relationship across all three dimensions of well-being.

This study is particularly significant because so few prospective datasets for a natural disaster exist (Bravo et al. 1990a; Canino et al. 1990) and few studies have simultaneously considered mediating and moderating resources for multiple outcomes (Norris et al. 2002). Past research examining the stress-distress relationship for life events has typically explained only 10% of the variance (Thoits 1983) in part because they did not model the stress process. By modeling the data using the stress process, it was possible to explain more variance around the three outcome variables than found in previous studies. This study advances research on natural disasters because it provides evidence that even moderate disasters affect mental health. The prospective data for this study and use of multiple outcomes provides support to other research with similar findings that used cross-sectional designs. Using the stress process model in this way has led to a greater explanatory power of stress related matters and natural hazards.

There are several noteworthy limitations to this study. Few people experienced significant flood exposure so the results from this study may not be as comparable to those of other natural disasters with more severe impact. There
was some sample attrition following the flood. Those respondents lost between
the two measurement intervals have significantly different means and variances
for measures in the study, but the correlation between measures is not different
(Ginexi et al. 2000). Therefore, it is possible that some respondents most affected
by the floods were not contacted for the post flood interview. Finally, this study
relied exclusively on self-report measures rather than more objective evaluations
of flood impact, depression, and economic hardship. However, many of the mea-
sures have been used in previous research (Mirowsky and Ross 1991; Radloff
1977; Smith et al. 1986) where they have proven to be reliable and valid.

Future research should attend to the possibility that different stressors may
elicit a different process. In other words, would we find a similar process for
all acute stressors or does this process operate differently for specific types of
stressors? Much of the research on stress suggests that acute events impact
mental health in different ways (Baum et al. 1992; Lebovits, Bryne, and Strain
1986). Specifically with regard to disasters, those over which we might expect
to exercise some control, either through preventive means or prompt
responses, will have greater impact on mental health and sense of control than
events which we might not expect to control. More research needs to be done
to test reciprocal paths within the stress process model using broader samples
that capture other configurations of stress.

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Appendix A: Items Used in Constructing Indices

**Flood Impact**

1. Have you had to temporarily evacuate or move out of your home anytime since June 1993 because of problems with water flooding?
2. Did you get water in your home from the flooding this summer?
3. Was there water on your property?
4. Were you temporarily or permanently out of work due to the flood?
5. Were other members of your household temporarily or permanently out of work due to the flood?
6. Did you or other household members lose income due to the flood?
7. Did you lose water service due to the flood?
8. Did you lose electrical service due to the flood?
9. Did you have any illness or injury as a result of the flood?
10. Was anyone else in your household ill or injured as a result of the flood?
11. Did you experience any damage or loss to your property or possessions?
12. I am going to read a list of items, please identify any losses or damage that you had because of the flood.
   - Did you experience any damage or loss to your . . .
     a) House
     b) Furniture or appliances
     c) Family heirlooms/mementos
     d) Clothes
     e) Car/truck
     f) Crops
     g) Land (topsoil)
     h) Access road to your home

**Economic Hardship**

In the past year, have you . . .

1. Had a substantial decline in your income
2. Had problems paying your bills on time
3. Had to use savings to get by financially
4. Been laid off from your job

**Flood Support Given**

1. Has there been anyone who has relied on you for this type of advice since the start of the flooding?
2. Has there been anyone who has trusted you that much since the start of the flooding?
3. Has anyone come to you for comfort because someone treated them badly and upset them since the start of the flooding?
4. Has anyone counted on you to be on his or her side when he or she had a disagreement or fight with someone since the start of the flooding?

**Flood Support Received**

1. Since the start of the flooding, if you had an important decision to make, has there always been someone whose advice you would be likely to ask and rely on?
2. Since the start of the flooding, if you made a serious mistake that could get you into trouble, has there always been someone you trusted enough to tell about it?
3. Since the start of the flooding, if someone treated you badly and you were upset about it, has there always been someone you could go to for comfort?
4. Since the start of the flooding, if you had a disagreement or fight with someone, has there always been someone you could go to for comfort?

**Sense of Control**

1. I am responsible for my own successes.
2. I can do just about anything that I really set my mind to.
3. The really good things that happen to me are mostly luck.
4. Most of my problems are due to bad breaks.
5. I have little control over the bad things that happen to me.
6. I am responsible for my failures.
7. My misfortunes are the results of mistakes that I have made.
8. There’s no sense planning a lot, if something good is going to happen, it will.

**Depressive Symptoms**

Please tell me the number of days in the past week including today that:

1. You felt happy
2. You felt people were unfriendly
3. Your sleep was restless
4. You felt sad
5. You enjoyed life
6. You had crying spells
7. You felt hopeful about the future
8. You felt you were as good as other people
9. You felt that people disliked you
10. You felt bothered by things that usually don’t bother you
11. You thought your life had been a failure
12. You felt like not eating; your appetite was poor
13. You felt you could not get going
14. You felt lonely
15. You had trouble keeping your mind on what you were doing
16. You felt that you could not shake off the blues even with help from your family or friends
17. You felt that everything you did was an effort
18. You felt fearful
19. You talked less than usual
20. You felt depressed

**Anxiety**

1. I find it hard to keep my mind on a task or job.
2. I cannot keep my mind on one thing.
3. I have periods of such restlessness that I cannot sit long in a chair.
4. I am usually calm and not easily upset.
5. Life is a strain for me much of the time.
6. I sometimes feel that I am about to go to pieces.
7. I feel anxiety about something or someone almost all the time.
8. I frequently find myself worrying about something.
Post Traumatic Stress Disorder (PTSD)

1. Did you keep remembering the flood when you did not want to?
2. Did you keep having dreams or nightmares about the flood?
3. Did you ever suddenly act or feel as though the flood was happening again, even though it wasn’t?
4. Did you ever get very upset when you were in a situation that reminded you of the flood?
5. After the experience, did you find you no longer had loving or warm feelings toward anyone?
6. Did you go out of your way to avoid situations that might remind you of the event?
7. Did you try hard not to think about it?
8. Did you develop a memory blank so that you could not remember certain things about the event?
9. Did you feel isolated or distant from other people afterwards?
10. Did you begin to feel that there was no point in thinking about the future?
11. Did you lose interest in doing things that used to be important to you?
12. Did you have more trouble concentrating than usual?
13. Did you feel irritable or lose your temper?
14. Did you have more trouble sleeping than usual?
15. Were you concerned about danger?
16. Did you feel jumpy or easily startled?
17. Did you sweat or heart beat fast?