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Predicting Post-Disaster Adjustment After the Red River Flood: An Analysis of Resource Loss and Pre-Flood Preventative Behaviors

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PREDICTING POST-DISASTER ADJUSTMENT AFTER THE RED RIVER FLOOD:

AN ANALYSIS OF RESOURCE LOSS AND PRE-FLOOD PREVENTATIVE

BEHAVIORS

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Holly J. Hegstad
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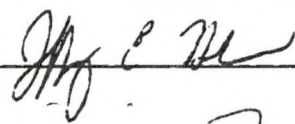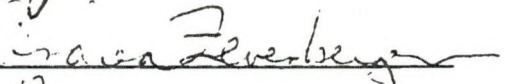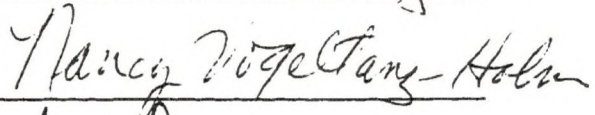
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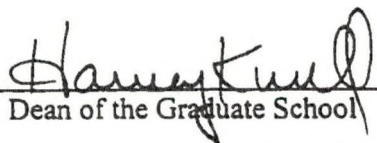
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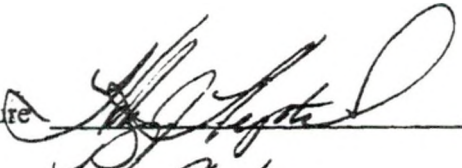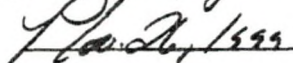
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ABSTRACT

The Conservation of Resources theory postulates that individuals will act to obtain, retain, or protect those resources that are of value to them (Hobfall, 1989). Natural disasters often result in depletion of resources, the extent of which has been found to be a robust predictor of post-disaster adjustment (Freedy, Hobfall, & Ribbe, 1994; Freedy, Shaw, Jarrel, & Masters, 1992; Norris & Uhl, 1993; Smith & Freedy, 1994). Three-hundred-four victims (131 males, 171 females) of the 1997 flood of the Red River returned surveys assessing their levels of preparation, resource losses, and psychopathology 12 to 16 months after the flood. It was hypothesized that resource loss would represent the best predictor of outcome measures of psychological distress (anger, anxiety, depression, somatic complaints, and frequency/amount of alcohol use). It was also hypothesized that individuals with high levels of pre-flood preparation and high levels of resource loss would experience the greatest overall pathology, and that individuals with low levels of pre-flood preparation and low levels of resource loss would experience the least overall pathology. Individuals with high preparation, low resource loss, and low preparation, high resource loss, would evidence intermediary levels of pathology. Results were consistent with previous research, in that resource loss was the strongest predictor of depression and somatic complaints. It accounted for the second highest proportion of variance for anxiety, after coping style. Results did not support that amounts of preparation were associated with psychological distress. Theoretical and

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practical implications and limitations of the current study are addressed, and directions

for future research are discussed.

INTRODUCTION

Natural disasters are traumatic events which often affect hundreds or even thousands of people. Although disasters are not always associated with severe emotional breakdown, it is not unusual to find that victims of such events exhibit considerable amounts of stress. Research has shown that casualties of natural disasters result more from secondary emotional and psychological maladjustment (e.g., suicide, stress-related heart problems) than actual physical harm (e.g., drowning) (Wood & Cowan, 1991). Victims of catastrophic events frequently experience heightened anxiety and display symptoms of depression that can extend for prolonged periods after the incident has occurred (Warheit, 1985). Flooding is a serious form of natural disaster. From 1976 through 1985, floods killed an average of 162 people each year and caused $3.4 billion in property damages (U. S. Weather Service, 1985).

Communities Involved in the Red River Flood of 1997

The cities of Grand Forks, ND, and East Grand Forks, MN, are located approximately 80 miles from the Canadian border and 150 miles from the South Dakota border. The population of the two cities is estimated at approximately 60,000. The communities are separated by the Red River. Between November, 1996, and March, 1997, the Red River Valley experienced its most brutal winter in history (Bakken, 1997). During this time, the greater Grand Forks community received a total seasonal accumulation of 98.6 inches of snowfall. The area also reported a record eight blizzards

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for the season. The final and most devastating blizzard was an ice storm occurring April 4-6, 1997, resulting in wide-spread power outages throughout many regions of North Dakota, South Dakota, and Minnesota. As spring approached, the accumulation of record snowfall coupled with warmer air resulted in massive overland flooding, further exacerbated by the geological layout of the Red River Valley. The flatness of the region limited drainage options for much of the melting snow, and the water gradually spread out over the plains before draining into the Red River. The National Weather Service had predicted flooding throughout the Red River Valley. The flood crest in Grand Forks was expected to occur at 49 feet during the week of April 20-27, the highest level in 100 years. The prediction had remained at this level for several weeks prior to any flooding. The dikes built along the River in Grand Forks had been created to withstand flood waters from 51-52 feet (Bakken, 1997).

Throughout the Red River Valley, community members worked to prepare for possible flooding of their communities, homes, and possessions. Many local businesses, universities, and schools encouraged their employees or students to volunteer during regular work or school hours. Among the various activities, community members fortified dikes, filled sandbags, acted as "dike walkers" (assessing the potential for leaks and structural weaknesses) and provided food and transportation to other volunteers. Although many individuals had been involved earlier in voluntary flood preparation efforts (e.g., filling and storing sandbags), sandbagging and dike building began in earnest on April 3, with an urgent call made for volunteers to raise the dikes from three to seven feet at Riverside Park in Grand Forks (Bakken, 1997). The following day, the blizzard/ice storm nearly halted emergency flood fighting efforts throughout the Red

River Valley. Volunteers recouped their efforts after the storm, and by April 11, volunteers were walking along the dikes around the clock looking for structural weaknesses. On Friday, April 18, with the Red River at 52.5 feet, the clay dikes began to dissolve on both sides of the river, and water rapidly began to flood the cities of Grand Forks and East Grand Forks (Bakken, 1997). The cities ordered mandatory evacuations of all residents in the path of flood waters, and the National Guard was called to assist with these evacuations. By April 19, four feet of water covered the downtown area of Grand Forks, and a fire spread across three blocks of downtown businesses, eventually damaging or destroying 11 historic buildings. On April 21, with 75% of Grand Forks residents and 90% of East Grand Forks residents evacuated from their homes, the flood waters crested at 54.11 feet (Bakken, 1997).

In total, Grand Forks and East Grand Forks received an estimated $1 billion in flood-related property damages. Flood water entered approximately 11,000 Greater Grand Forks homes. In fact, only 27 single-dwelling residences in East Grand Forks, MN, were undamaged by flood waters. Fifty thousand individuals were mandatorily evacuated from their homes and community. Most victims left their homes with what few belongings they could take in their automobiles or could carry, and fled to local shelters, nearby communities, or out-of-state refuges. Most Grand Forks residents seeking refuge were ultimately housed at a shelter established through the Grand Forks Air Force Base. Other local shelters included college campuses in neighboring communities.

The University of North Dakota and local Grand Forks public schools were canceled for the remainder of the semester. The Grand Forks flood evacuees were not

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allowed back to their homes until April 26, almost a week after their forced evacuation
(Bakken, 1997). Electricity was unavailable in many homes for several weeks, and the
cities were without drinkable tap water until May 10. Adding to the hassles of post-flood
clean-up were a number of delays. Many areas of the city had to reconnect electrical
supplies, replace heating units, and go without running water for cleanup. Many local
grocers and businesses were seriously damaged or were unable to locate their employees;
therefore they were unable to accommodate the needs of the community. Hospitals and
pharmacies were unable to provide for medical needs of residents, or operated
understaffed. Mail was distributed from a central location in the city. Daycare facilities,
many of which were in private homes, were unavailable. To further complicate lives,
emergency disaster relief monies and decisions about homes were tied up in
governmental policies and politics. Some individuals found immediate assistance
through organizations such as the Salvation Army, FEMA, the Army Corps of Engineers,
and the American Red Cross. An anonymous donor provided $2000 per household for
individuals affected by the flood. Temporary housing was made available by FEMA.
Although few would suggest that these services were unwelcome, the job of rebuilding
the community would last long after such services were depleted or deemed "no longer
necessary."

<center>The Psychological and Physical Impact of Disaster</center>

In an attempt to understand how the Red River Flood affected flood victims in
Grand Forks and East Grand Forks, it is useful to examine how other natural disasters and
floods have affected other communities and the individuals living therein. One of the
earliest and most well-researched of natural disasters was a flood occurring in 1972 in

Buffalo Creek, West Virginia. The flood was caused by a build-up of slag dam from coal waste deposited in the Buffalo Creek over a period of massive corporate negligence on the part of local coal company. The water broke through the dam after several days of rain, inundating the valley area below, and creating instant destruction in several mining hamlets in the valley. One hundred twenty-five people were killed and 5000 left homeless within a few hours. Many of the survivors were witness to bodies of living and dead people and animals being swept down in the valley by the flood waters (Gleser, Green, & Winget, 1981).

Researchers found that survivors of the Buffalo Creek flood reported high levels of symptomatology, including anxiety, depression, confusion, and difficulty controlling emotions (Gleser, et al., 1981; Titchener & Kapp, 1976). Grief over deaths and loss of possessions, heightened isolation, anger, and hopelessness were among several symptoms found (Titchener & Kapp, 1976.) Persons displaced into temporary housing described feelings comparable to those of persons placed in concentration camps (Church, 1974). Specifically, survivors noted cramped quarters, lack of facilities for adequate hygiene, the constant presence of military personnel, and fear about the safety of friends and family. In addition, individuals reported problems sleeping, fear of rainstorms and thunder, fear of loud noises, over-concern with bodily functions, amnesia, and eating problems (Church, 1974).

The post-disaster period is of special interest to health professionals because of the significant negative impact on mental and physical health for survivors. Numerous studies have identified psychological dysfunction (i.e., Canino, Bravo, Rubio-Stipec, & Woodbury, 1990; Gibbs, 1989) and psychosomatic symptoms associated with traumatic

experience (i.e., Bowler, Mergler, Huel, & Cone, 1994; McFarlane, Atchinson, Rafolowicz, & Papay, 1994). Rubonis and Bickman (1991) performed a metanalysis of 52 disaster studies, analyzing the relationship between disaster occurrence and various symptoms of psychopathology, such as anxiety and depression. The investigators found that the experience of disaster is related to higher levels of overall psychopathology, with an average 18% increase in the prevalence rate of psychopathology following disasters, with a range between 5% and 40%. Methodologically, having a pre-disaster assessment is superior to relying on self-report of pre-disaster functioning or to post-disaster comparison with a non-affected group (Raphael, Lundin, & Weisaeth, 1989). However, the unpredictable nature of many natural disasters makes it difficult for adequate pre-disaster assessment to be conducted. However, those studies which utilized a non-disaster control group showed smaller effect sizes than those which solely relied on retrospective methods, suggesting that victims of disaster may exaggerate estimates of distress.

Studies have found that persons exposed to disaster report more symptoms of depression and anxiety after exposure to disaster, compared with symptom levels prior to exposure or to non-exposed individuals (Bowler et al., 1994; Canino et al., 1990; Phifer, 1990). The review by Rubonis and Bickman (1991) found prevalence rates among disaster survivors to be 39.9% for anxiety, 25.8% for depression, and 35.2% for global measures of psychological distress. Although most studies suggest that chronic and severe psychopathology following natural disaster is rare, milder, more transient distress is common (Norris & Uhl, 1993; Rubonis & Bickman, 1991; Warheit, 1985).

Although disaster-related psychological distress generally dissipates over time (Rubonis & Bickman, 1991), significant difficulties can persist and chronic psychological

disorders may develop. The eruption of Mount St. Helen's volcano in Washington resulted in increased prevalence of depression, generalized anxiety, and post-traumatic stress up to 24 months after the event for individuals living nearby the volcano (Shore, Tatum, & Vollmer, 1986). Similarly, firefighters exposed to a catastrophic brushfire evidenced heightened distress 29 months after the incident (McFarlane, 1988). Five years after the Three Mile Island disaster, individuals originally affected continued to report significantly elevated levels of distress (Baum, 1987). Four years after the dam collapsed at Buffalo Creek, victims continued to have death anxiety, survivor guilt, and nightmares (Lifton & Olson, 1976). Later researchers found that, relative to a group of comparison people living in a nearby community, Buffalo Creek survivors continued to evidence more occurrences of major depression, generalized anxiety and PTSD symptoms almost two decades after the Buffalo Creek flood (Green, Lindy, Grace, Gleser, Leonard, Karol, & Winget, 1990).

In the studies conducted by Phifer (1990) and Bowler et al. (1994), disaster exposure was found to be related not only to an increase in depression and anxiety, but to physical symptoms as well. Somatic complaints are an important aspect of mental health to consider, given that physiological symptoms may reflect psychological dysfunction (McFarlane et al., 1994). Another study found that individuals exposed to flash floods and mud slides had a higher prevalence of abdominal pain, vomiting, and nausea, as well as amnesia, paralysis, and fainting than did individuals not involved with these events (Escobar, Canino, Rubio-Stipec, & Bravo, 1992). Rubonis and Bickman (1991) found that in the eight studies that examined physical health, 35.8% of disaster victims complained of somatic symptoms. Solomon, Reiger, and Burke (1989) surveyed victims

of flooding and/or dioxin contamination and found that, in addition to elevated levels of depression, posttraumatic stress, and anxiety, victims also had greater levels of somatization than did unexposed respondents.

Predicting the Impact of Disaster on Mental and Physical Health

Mediating variables are the "characteristics of the victim or of the disaster that play a central role in determining physical and mental health consequences for survivors" (Green & Solomon, 1995, p. 171). Several studies have examined those mediating variables which best predict post-disaster adjustment, including personal characteristics and severity of exposure to the disaster.

In general, studies examining the relationship between gender and post-disaster adjustment have been inconclusive (Green & Solomon, 1995). In their meta-analysis, Rubonis and Bickman (1991) found that women are more likely than men to experience psychological distress following disaster. However, the authors cautioned that the types of psychological problems measured by most studies (i.e., anxiety and/or depression) are more prevalent in women than men, in general. Furthermore, although women tend to report higher rates of anxiety and depression than men after disaster (Shore, Tatum, & Vollmer, 1986), men report more physical complaints and substance abuse than women. (Logue, Hansen, & Streuning, 1979).

Age-related variables are similarly difficult to identify as mediators, due to inconsistencies among studies in age cutoffs and discrepancy in the findings for any particular age as more "at risk" for maladjustment or psychological distress (Rubonis & Bickman, 1991). However, it has been suggested that physically healthy older individuals may be less vulnerable to post-disaster maladjustment than are middle-aged

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individuals because of greater likelihood of having survived previous traumatic events (Norris & Murrel, 1988). Middle-aged individuals, on the other hand, are less likely than older individuals to have had experience with trauma (Norris & Murrel, 1988), and are likely burdened by the additional responsibility of assuring safety for their children (Green & Solomon, 1995). Race and ethnicity have not been examined extensively in the context of disaster adjustment, and those studies which have included cultural variables as mediators have not accounted for socio-economic differences or the extent to which the losses have meaning for the culture exposed to the disaster (Green & Solomon, 1995). Similarly, few studies have examined socio-economic status, education, or prior psychiatric history as predicting variables of post-disaster pathology (Green & Solomon, 1995).

The nature and severity of the disaster itself has been found to be a strong predictor of psychological functioning following the event (Green & Solomon, 1995, Rubonis & Bickman, 1991). However, as few studies clearly identify the characteristics of the discussed disaster, the exact elements responsible for increased psychological dysfunction cannot easily be defined. Furthermore, as larger-scale disasters are often associated with more chronic and ongoing disruptions and loss of community resources to solve problems, it is difficult to separate acute from chronic disaster-related variables (Green & Solomon, 1995). In this way, losing one's place of residence might be associated with immediate psychological distress, but may also be responsible for ongoing psychological problems if that place of residence is not replaced or repaired over time.

When determining the psychological outcomes of losing the residence, it is becomes difficult to differentiate in time when such loss moves from an "acute" to a more "chronic" problem. One disaster-related variable does appear to be a consistent predictor of psychological outcome. The occurrence of human casualties is associated with relatively greater levels of psychological distress in survivors (Rubonis & Bickman, 1991). Similarly, natural disasters which are considered to be "life-threatening" have been found to be associated with greater negative psychological adjustment compared with those which are not considered "life threatening" (Freedy, et al., 1992; Shore et al., 1986). The amount of time elapsed since the disaster is also associated with decreases in reported symptoms (Rubonis & Bickman, 1991).

The Difficulty of Defining Stress In Disaster

Although the research literature documents fairly well the relationship between negative psychological adjustment and natural disaster, much evidence also shows that individuals who are exposed to natural disaster have increased daily stressors. Natural disasters require many alterations in daily life, including alterations in daily activities and familial and social roles. Resulting daily stressors may include job loss, economic problems, loss of tangible goods, and residential displacement. However, given that many researchers disagree on what constitutes clinical stress, measuring stress levels and their impact following natural disaster is often a difficult task.

According to the DSM-IV, post-traumatic stress disorder is generally considered of be triggered by any psychologically distressing event outside of the usual range of human experiences (American Psychiatric Association, 1994). Traumas involve, among other things, serious threats to one's life, threats to the lives of family or friends,

destruction of one's home, or witnessing people killed. These experiences can generate intense fear, terror, and helplessness. Victims may re-experience the event through dreams or nightmares, and sometimes avoid stimuli that remind them of the event (American Psychiatric Association, 1994).

Although few people would dispute that individuals involved in natural disasters such as flooding are exposed to increased daily stressors and report increased maladjustment, symptoms of PTSD are frequently not present or of the severity necessary to warrant diagnostic consideration in many disaster situations (Green & Solomon, 1995). This is not surprising, as many disasters, such as flooding, do not involve serious threat to life or safety (Evans, 1997). Furthermore, although some individuals may experience PTSD symptoms, many do not end up with a PTSD diagnosis. As such, the use of PTSD as the primary dependent diagnosis in disaster research often does not accurately reflect the effects that some disasters have on survivors. Little evidence exists to explain why some victims of stressful circumstances respond as they do (e.g., with somatic problems, heightened general anxiety, depression) across a variety of traumatic events such as floods, hurricanes, tornados, or fire, while others remain unaffected. In an attempt to address these problems, the Conservation of Resources (COR) model was developed to predict distress in natural disasters, given these events often vary in their typology and their psychological effects (Hobfall, 1989).

The Conservation of Resources (COR) Model

The COR model is based on the assumption that personal, social, and environmental factors may interact to result in psychological distress. The basic tenet is that individuals will actively strive to obtain, retain, and predict resources valued to them

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and to society, in general (Hobfall, 1989). Resources are defined as "those a) objects, b) personal characteristics, c) conditions, or d) energies that are valued by the individuals or that serve as a means for attainment of these objects, personal characteristics, conditions, or energies" (Hobfoll, 1989, p. 516). Object resources include those items considered necessary for survival or valued due to scarcity or demand. Examples of object resources would include one's residence, medicine, or transportation. Energy resources include time, income, education, insurance, credit, and knowledge; these resources are valued not for their intrinsic value so much as their value in aiding the acquisition of other resources. An example of this would be investing one's time into a volunteer work activity in hopes of securing skills which will lead to a well-paying or high status job at a later time. Condition resources, also known as social resources, represent resources which are valued with respect to the condition or role that they represent in society. As such, these represent resources to the extent that they are subjectively valued, or in their ability to obtain other resources. For example, a stable marriage or secure employment may be critical to an individual's ability to cope with stress. Finally, personal resources represent those characteristics which are prized aspects of the self, or those which may lead to other valued resources. For example, one may pride himself/herself on having a good sense of humor. In addition, the characteristic of high self-confidence (a personal resource) may lead to high job performance ratings by supervisors (a condition resource), which could lead to greater income (an energy resource). Other examples of personal resources include a sense of optimism, hopefulness about the future, or a feeling that one's life has purpose.

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The COR model defines psychological stress as a reaction to the environment in which there is a threat of net loss of resources, actual loss of resources, or a lack of resource gain after resources have been invested (Hobfall, 1989). The COR model posits that there are commonalities in what is generally considered to have value; most members of the dominant culture in this country consider home, family, companionship, and time to be valued resources. However, the model also allows for variability among individuals who may differentially value specific resources. For example, two individuals might own similar vehicles of identical monetary value. However, one individual might value their vehicle more because it represents the payoff of working hard at a job, whereas the other values it less as it represents only a means of getting from place to place. In this way, the differing reasons for valuing the object change the value of that object for the individual. The COR model also considers objective losses, and allows for an interaction between quantifiable losses and the subjective value of those losses. To the extent that an environmental event results in quantifiable losses for those involved, distress may be measured relatively unobscured by subjective appraisals. For example, a flood often requires quantifiable financial resources to recoup losses, requires individuals to physically leave their residences, family, and/or community for measurable periods of time, and requires individuals to use specific periods of time to clean their belongings (Hobfall, 1989). However, the amount of loss experienced in dollars or hours should reflect distress only to the extent that any particular individual views his or her time and money as valuable resources.

The COR model also suggests that when resources are chronically or sequentially threatened or depleted by environmental strains, options in dealing with the situation can

be reduced and psychological distress may result (Hobfall, 1991). When available resources are used to respond to a stressful situation, an individual may experience a depletion of these resources. Thus, individuals have only so much energy, time, or money to invest in preventing the loss of valued resources threatened by stressors such as flood. To the extent that individuals deplete their store of resources, they will be less able to cope with continued stressors, resulting in even greater stress. According to the model, since accrued losses increase stress, individuals who experience greater loss will be increasingly vulnerable to pathology or maladjustment. Research has supported this in that situations of persistent adversity and long-term threat have been found to be more closely related to dysfunction than acute, negative life events (Rutter, 1986). Similarly, Pearlin (1983) found that persistent strains on the roles one holds in life can reduce one's sense of mastery and self-efficacy and lead to depression and dysfunction.

Research Applications of the Conservation of Resources Model

Few studies have directly assessed the predictive validity of the COR model, as it represents a relatively new theory of stress response to disaster (Hobfall, 1989; Hobfall & Lilly, 1993). Resource loss was first used as a predictor of distress in Hurricane Hugo, which devastated Charleston, South Carolina (Freedy et al., 1992). The authors surveyed 418 medical school faculty and staff eight weeks after the area was affected. Resource loss was measured by a 52-item questionnaire developed by the researchers. Results suggested that resource loss was a more important mediating variable than demographics or coping styles in predicting psychological distress, accounting for 34.1% of the variance. A separate study assessing the effects of Hurricane Hugo found that life threat, financial loss, and personal loss correlated with depression, anxiety, and somatization

(Norris & Uhl, 1993). Regarding these hurricane studies, the COR model would posited that losses of energy resources (money) and object resources (personal belongings) presented a general threat to the major reason individuals acquire resources in the first place (i.e., to sustain life). As resources are depleted and thus not available for coping with other more general life stressors, serious psychological problems such as clinical depression or anxiety disorders become more likely (Hobfall, 1989).

The COR model was later used to predict psychological distress in other types of natural disasters. Freedy, Saladin, Kilpatrick, and Saunders (1994) found results similar to those noted in Freedy et al. (1992), following the Sierra Madre earthquake. Psychological distress was assessed for 229 adults who were present during the earthquake, using a nine-item symptom checklist. Participants reported on a variety of symptoms and their intensities over the course of a one-week period. In this disaster, resource loss accounted for 11.2% of the variance, and was a better predictor than demographics, trauma history, or life-threat. Only reported history of low magnitude events explained a greater portion of variance (13.7%), with prior history of involvement in similar events the strongest predictor of negative psychological impact. This would support the contention that exposure to natural disasters would not "innoculate" survivors to psychological distress in future traumatic events, but actually make them more vulnerable.

More recently, Smith and Freedy (1996) utilized the COR model in an attempt to predict physical as well as psychological symptoms following a flood in the Midwest. One-hundred-thirty-one adults in communities affected by the 1993 Mississippi River flood were surveyed. Heirarchical multiple regressions were performed to predict three

outcome variables four months after the flood. Predictor variables included demographics, threat to life, prior disaster experience, and resource loss. For each outcome variable, a significant proportion of the variance was accounted for by the combined predictors (R's between .41 and .57). Resource loss was associated not only with psychological distress, but with physical symptoms as well.

In 1997, the COR model was used to predict psychological distress during a low life threat, chronic flood, in Devil's Lake, North Dakota (Evans, 1997). In this study, 134 individuals residing either on the flooding lakeshore or the unthreatened neighboring communities completed a telephone survey. Predictor variables included a 32-item version of the resource loss questionnaire, demographic characteristics, proximity to the flood, and perceived threat to life and safety. Outcome measures included a screening measure of psychopathology, a mood scale, and a measure of stress-related physical complaints. Heirarchical multiple regression analyses of predictors were conducted for each outcome variable. In each case, resource loss explained a significant proportion of the variance, even when entered last into the regression equations.

Finally, a recent study has addressed the predictive utility of the COR model in areas affected by the threat of flooding (O'Neill, Evans, Bussman, & Strandburg, in press). The authors surveyed 377 faculty and staff of North Dakota State University when there was an imminent threat of flooding of the Red River in 1997. The authors assessed demographic characteristics, perceived threat to safety and risk of being impacted by the flood, threatened loss of resources, and psychopathology. Hierarchical multiple regressions were performed, and it was found that adding resource loss to the

equations significantly increased the amount of variance accounted for withing the outcome variables of physical symptoms, psychological symptoms, and negative mood.

Taken together, the research suggests that the COR model may be useful for predicting various symptoms of psychopathology among different types of natural disasters involving higher or lower life threats. It may also have utility in assessing psychopathology associated with the threat of disaster. However, there remains a paucity of research assessing other basic tenets of the model.

Limitations of Research on the COR Model

It is important to note that in all of the studies noted above, only resource loss was measured. No study assessed the degree to which individuals valued those lost resources. As noted previously, it would be expected that greater pathology would be expected when the resources lost were of value to the individual (Hobfall, 1989). In addition, it is possible that resources may be recouped or even gained following a disaster. Only recently has the original measure of resource loss been adapted to assess the subjective value of resource loss and to include potential resource gains (Hobfall, 1995). To date, no research has utilized this adapted measure.

The COR model does appear to be an appropriate and promising theoretical framework for predicting psychological distress following a traumatic event. However, research on the model has been limited to basic assessments of overall loss of resources. The model predicts that individuals will act in ways to protect resources when they are threatened, and that doing so will deplete available resources (Hobfall, 1989). Given that individuals will actively exhaust resources protecting those things they value, it would be expected that if those efforts were not successful in protecting resources, individuals

engaging in such behaviors would experience greater stress and psychological dysfunction. Research has not yet directly addressed whether individuals actually engage in behaviors in an attempt to protect their resources. It would be expected that disasters with some degree of realistic threat to one's personal property, lifestyle, or community allow for preparation and the expenditure of energy resources to minimize or deflect damage to those valued resources. If individuals expect higher levels of resource loss, they might expend much of their available resources protecting other valued resources. Doing so should be associated with greater pathology subsequent to the disaster. To date, no study has utilized the COR model as a means of identifying whether preventive behaviors intended to protect resources prior to a disaster affect the level of psychological adjustment or maladjustment after the disaster. O'Neill et al. (in press) did find that expectations of higher resource loss was associated with more overall psychological distress during the flood threat period than expectations of less resource loss. It may be hypothesized that those individuals experiencing a greater threat will engage in a greater number of preventive behaviors. However, this was not specifically assessed in the O'Neill et al. (in press) survey. It may be that engaging in such behaviors represents a means of coping with stress by attempting to control the situation, or to control the possible outcomes from the situation, when there is a realistic threat of resource loss. A limited number of studies have addressed how perception of control, in general, affects post-trauma adjustment, blame, and coping.

<p style="text-align:center">Blaming: Issues of Control and Coping with Disaster</p>

A flood represents a natural disaster which may be considered by some to be an "act of God." Other individuals may blame some assumed responsible parties or persons,

or themselves. Victims may wonder if someone could have prevented the event, and often one or more individuals are blamed for the losses. In the case of the Red River flood, local newspapers cited angry flood victims actively blaming sources they believed were responsible for the flood. For example, some individuals charged that weather and flood predictions were inaccurate and that those responsible for making them were incompetent (Grand Forks Herald, 1997, April 25). Others suggested that farmers used improper drainage systems (Grand Forks Herald, 1997, May 7). Blaming behaviors might suggest that some victims believed that others were responsible, at least to some degree, for the damages incurred on individuals and the community. On the other hand, community members were reminded by FEMA and insurance companies that the potential for flood had been predicted, and that individuals bore some responsibility for the purchase of flood insurance (Grand Forks Herald, 1997, April 12; Grand Forks Herald, 1997, April 25). One hypothesis for the variability in blaming behaviors witnessed among the Grand Forks flood victims is that attribution of causality in events is reflective of perception of control over the event.

The locus of control concept (Rotter, 1966) classifies people as 'internals' or 'externals' according to how they perceive contingency. If events are viewed by a person as resulting from his or her own behaviors, the individual is characterized as having an internal locus of control. On the other hand, if an event is interpreted as resulting mainly from chance or from manipulation by others, the individual is characterized as having an external locus of control. However, locus of control may be mediated by aspects of the event in question. Observers of catastrophes are more likely to assign responsibility to an accident victim when the severity of the accident is greater than when it is not (Walster,

1966). In fact, Walster (1966) found that unaffected observers tend to consider that flood victims should have foreseen the inevitable inundation and thus should have located their homes further from the river. Further research suggests that most victims will not attribute responsibility to themselves. In a study conducted among homeowners in a region in which many residences were destroyed by a severe brush fire, those individuals whose homes were destroyed attributed losses more to bad luck and less to their own efforts, despite the fact that victims did not differ from nonvictims in actual efforts during the fire, nor in characteristics of their homes (Parker, Brewer, & Spencer, 1980).

DeMan, Simpson-Housley, and Curtis (1985) investigated the phenomenon of locus of control as it related to assignment of responsibility for a fictitiously described flood, participants' experience with flood, amount of damage or loss, and anxiety. Contrary to expectations, locus of control was not related to attribution of responsibility or anxiety. It was also found that attributions of responsibility were not related to participants experiences with flooding, or whether involvement in flooding resulted in loss or damage to their property. Researchers found that for women, but not men, as severity of flood damage increased, a fictitious official "in charge" of levee maintenance was more likely to be assigned responsibility for flooding. In men, assignment of greater responsibility to the "official" was more related to a lower degree of certainty about whether the official had performed his job adequately. However, as the above study did not utilize actual flood victims, interpretation of results should be made cautiously. In another study assessing the psychological impact on actual flood victims, external locus of control was associated with higher trait anxiety (DeMan & Simpson-Housley, 1985).

Results from this study suggest that perceived controllability of natural disasters such as floods may be an important predictor of anxiety.

In a survey of South African flood victims, Burger, van Staden, and Nieuwoudt (1989) found that although perceptions of loss of control and feelings of uncertainty were reported by 65% of respondents, there were no significant relationships between respondents' experiences of stress or coping styles and their locus of control. However, a small sample size (N=20) and inability to obtain a random sample (i.e., the sample consisted mostly of middle-aged adults) limits the conclusions that might be drawn. In fact, when interview data were analyzed and classified into themes, respondents' initial reactions to the disaster included despondency, helplessness, and reduced control over their experiences. Furthermore, the study failed to incorporate an unaffected control community, and exposure to the flood itself might have affected perceived locus of control.

Other researchers (Brickman, Rabinowtiz, Karuza, Coates, Cohn, & Kidder, 1982) suggested that it is important to distinguish between attribution of responsibility for a problem (i.e., who is to blame for the cause of a flood) and attribution of responsibility for an appropriate solution. Brickman et al. (1982) maintains that victims of stressful events may cope most effectively if they do not blame themselves for the victimizing event, but believe that it is their responsibility to deal with the consequences of the event after it has occurred. Although blaming behaviors in the case of the Red River flood may reflect locus of control, an alternative hypothesis might be that blaming behavior is a form of coping with the disaster. Such blaming may be considered adaptive to the extent that such behaviors reduce feelings of vulnerability in victims and observers (Janoff-

Bulman, 1982). In the classic stress response literature, coping refers to a range of responses designed to avoid, prevent, or control either the source or the experience of stress (Lazarus, 1966). Lazarus distinguished between problem-focused coping, directed toward addressing the external situation causing the stress, and emotion-focused coping, directed toward managing the internal emotional response to the situation. In the Red River flood, community members were faced with the possibility of their possessions and/or their communities being damaged or destroyed. They were required to cope with problems such as whether and how to salvage their homes, businesses, and possessions. Some individuals may have coped with this stress by becoming involved directly with flood-fighting efforts (problem-focused coping), while others may have utilized more emotion-focused coping methods. Still others might have utilized both types of coping to some extent.

Not all of the literature, however, consistently supports the contention by Brickman et al. (1982) that self-blame is necessarily an ineffective coping mechanism. In an attempt to assess coping styles and attribution of blame, Solomon et al. (1989) surveyed victims of flooding and/or dioxin contamination and found that victims who blamed the flood damage on themselves were more likely to seek help from relief organizations than were victims who did not hold themselves accountable for the flood damage. The authors concluded that assigning blame impedes psychological recovery in situations where a more active coping response (e.g. seeking agency assistance for flood relief) is an option. However, blaming others facilitates recovery in disasters when active problem solving is *not* an option, which is not generally the situation after events such as floods. In another study, it was found that individuals who blame themselves for the

trauma but use characterological ("I am a bad person") rather than behavioral ("I did not adequately prepare") attributes are more likely to experience psychopathology (Walster, 1966).

The COR Model and Coping

The COR model states that coping behaviors are activities individuals engage in to alleviate the potentially negative effects of stress. Individuals engage in coping behaviors to protect themselves from threats of resource loss or further depletion. However, Freedy et al. (1992) examined coping styles after Hurricane Hugo, and found them to be only weakly related to the psychological impact of the hurricane upon individuals. The single aspect that was significantly related to psychological outcome was disengagement (e.g., not sharing feelings or thoughts about the situation with others, not behaving in ways to change the situation). The more proactive forms of coping (e.g., problem-focused) explained only 1% of variance. Green and Solomon (1995) also compared the effects of coping to the effects of stressful events, social support, and personal variables on psychological outcome. They sampled survivors of the Beverly Hills Supper Club fire. As predicted, objective loss (i.e., total loss of loved ones, threat of loss, witness of others' loss) aspects were the strongest predictors of outcome. Coping did not appreciably impact outcome, suggesting that such behaviors are relatively weak resources for individuals in cases of disaster.

Present Study

The present study was designed to investigate the relationships between individual preventive behaviors, flood damages, and psychological dysfunction. The COR theory suggests that victims of hazards such as floods will respond to such threat,

when it is known, with behaviors to protect those resources which are of value to them (Hobfall, 1989). However, the act of preventing or limiting resource loss requires individuals to use their other available resources. The COR model would suggest that initial losses will make individuals more vulnerable to further loss (Hobfall, 1989). As such, individuals who were actively involved, spending significant time and/or money in the flood fighting efforts might be expected to have had diminished resources for coping with additional post-flood losses.

However, it might be argued that, regardless of the resources available to individuals, if they did not perceive that they were at risk for flooding, they would not have utilized resources in preventive behaviors. Furthermore, those individuals who perceived that they had some control over the flood may be expected to use more active coping mechanisms after the flood, consistent with Solomon et al. (1989). To the extent that feelings of control may influence coping responses, it may be expected that the degree to which flood victims prepared for and worked to prevent flooding in their communities and on their personal property may be associated with the type of coping strategies that they engaged in to deal with the stress of disaster and the expression of general psychological maladjustment.

The COR model has found resource loss to be a robust predictor of psychological outcome for several types of disasters. However, floods provide a unique disaster experience, in that they allow for individuals to expend available resources to prepare for the flood. Until presently, no research has directly addressed how such behaviors may affect general psychological functioning after the disaster. The present study used the COR model to expand upon what is known about the relationship between pre-flood

preventive behaviors, post-disaster psychological distress, demographic variables, and coping styles. Examining the effects of the 1997 flood of the Red River further validates the reliability of the COR model across disaster situations, and provides support for the model in its predictions about the effects on affected community members of acting to protect personally valued resources. Although all disaster are, by nature, unique, the present study sought to add to the literature by identifying psychological outcomes that might be expected in similar disaster events (e.g., where there is low life threat, time for preparation prior to the disaster, and longer-term disruption to the community). The present study also considered the potentially mediating factor of perceived vulnerability to disaster. That is, individuals who perceive they have the greatest potential for resource loss may be most likely to prepare for such loss, and may actually be most likely to be affected. Using perceived vulnerability as a covariate allowed for analysis of unique variance attributable to the act of flood prevention in understanding the effects on post-flood adjustment. Finally, the nature of the present disaster was characterized by a great deal of "finger-pointing" by both those affected and those not affected by flooding, as noted previously. As such, the present study addressed attributions of responsibility among those most and least affected by flooding. Given these considerations, the following hypotheses were studied:

1.   It was expected that the four types of resource loss would be better predictors of general psychological distress (anger, anxiety, alcohol use, depression, and somatic symptoms) than would demographic variables, coping style, and perceived life threat. Information derived from the findings would expand on previous research (Freedy, Hobfall, & Ribbe, 1994; Freedy, Shaw, Jarrel, & Masters, 1992; Norris & Uhl, 1993;

Smith & Freedy 1994) validating the COR in the context of a flood situation in which an entire community was displaced for extended periods of time. It was also expected that there would be a greater predictive ability of resource loss when the subjective value of those resources were accounted for, as compared with simple resource loss alone. Within the COR model, the resources of personal, object, energy, and condition resources were expected to represent greatest to least amounts of explained variance for outcome measures, respectively.

2.   Individuals who were actively involved in flood fighting and who reported greater resource losses would report higher scores on measures of anger, anxiety, depression, alcohol use, and depression than those individuals who were not involved with preventive behaviors, and those who did not experience greater resource losses, when perceived risk was accounted for statistically. Those individuals not involved in preventive behaviors and experiencing low resource loss would evidence the lowest levels on the dependent measures, when perceived risk was accounted for statistically. Individuals with high levels of resource loss and low levels of preventive behaviors, and individuals with low levels of resource loss and high levels of preventive behaviors would experience intermediary levels of psychological maladjustment, when perceived risk was accounted for statistically.

3.   Research on locus of control as a means of coping would suggest that blaming behaviors might reflect a means of coping with losses, and flood victims will not see themselves as responsible for their losses (Walster, 1966). As such it was hypothesized that among individuals receiving highest flood losses, and for individuals with the highest level of personal pre-flood preparation, responsibility for flooding that occurred

would be attributed to sources other than the self (e.g., chance, God, National Weather Service). Conversely, it was hypothesized that same individuals would attribute responsibility for prevention of flooding in the communities to the self, as it would be expected that to assume responsibility for positive outcomes would also represent adaptive coping.

METHOD

Participants

Participants included adult residents of either Grand Forks, ND, or East Grand Forks, MN. In total, 878 individuals were invited to participate, including 201 East Grand Forks residents and 677 Grand Forks residents. Surveys were coded as high, medium, or low damage, depending on the degree to which respondents' residences were damaged, as per their report. If the resident had moved since the date of the flood, they were to respond using their previous residences for coding. This was done to track rate of return in the surveys. High damage coding referred to residences in which flooding affected the main living area of the residence. Generally, this included the main floor, but could have included basements if this represented the area of primary residence (as in basement apartments, etc.). Medium damage coding reflected those residences in which a secondary, non-essential portion of the residence was damaged, but no damage occurred in the area of primary residence. This often included residences with basement flooding, when the basement was used for storage or recreational purposes. Low damage coding reflected residences in which no portion of the residence was damaged by flooding. However, individuals receiving this coding may have had damage to garages, crawl spaces, etc. A total of 304 (34.6%) completed surveys were returned. Return rates for the high, medium, and low damage areas for each community are listed in Table 1. The two communities did significantly differ in their rates of return, $X^2 = 9.65$, $p < .01$, with

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the East Grand Forks sample returning a greater proportion of their distributed surveys.

Furthermore, residential damage significantly affected return rates $X^2 = 52.46$, p <.01.

Respondents with low levels of residential damage were significantly more likely to

return their surveys than were individuals of higher residential damage. Low damage

areas did not differ from mediums damage areas, nor did medium damage areas differ

from high damage residences on return rates, p >.05.

Table 1. Community Response Across Levels of Residential Damage

	Surveys distributed	Surveys returned	
Community	n	n	%
Grand Forks, ND	677	216	31.9
Damage			
High	175	37	21.1
Medium	352	13	32.1
Low	150	66	44.0
East Grand Forks, MN	201	88	43.8
Damage			
High	64	28	43.8
Medium	112	48	42.9
Low	25	12	48.0

Of the total respondents, 43.1% were male (n= 131) and 56.3% were female (n=

171); two respondents did not indicate their gender. Respondents were primarily

Caucasian (n =283), with two African American respondents, five Native American

Respondents, two Hispanic respondents, one Asian American respondent, and one

Alaskan Native/Pacific Islander. Three respondents listed their ethnic affiliation as

"other." Mean age of respondents was 42.4 years, SD = 12.14, with ages ranging from 20

to 84 years. Of the total respondents, 169 (56.6%) had at least one child living in their home. Two-hundred-seven (68.5%) were married, 32 (10.6%) were divorced, 12 (4.0%) were cohabitating, 38 (12.6%) were never married, and 13 were (4.3%) widowed. The median income level was $35,000 to $45,000. Of the total respondents, 36 (4.1%) indicated that they were college students. Residents were displaced from their homes for an average of 61 days.

Materials and Measures

The materials used in the current study included a pencil and paper questionnaire, consent form, referral information for flood related mental health services for Minnesota residents, referral information for flood related mental health services for North Dakota residents. In addition, information on anniversary reactions to the flood was provided to all contacted households. The questionnaire included the following measures:

Demographic Information

Demographic information was collected on all respondents. Age, gender, marital status, ethnicity, number of children living in the home, and household income was assessed. The variable of income was measured in forced-choice ranges. In addition, respondents indicated their residential status (own or rent).

Pre-flood Preventive Behaviors

A questionnaire developed for the purpose of this study was used to measure pre-flood preventive behaviors. Participants were asked to recall whether or not they were involved in a number of pre-flood activities, such as filling sandbags to protect their property and the community, purchasing flood insurance, or "dikewalking." In addition, respondents were asked to estimate the amount of time and/or money spent in each of the

flood preparatory behaviors. Finally, respondents estimated the percent of their total monthly available time and money used in flood-fighting efforts.

Perceived Threat Due to Flood

Four questions related to perceived threat were asked. The first two questions assessed whether the respondent feared for his or her life and if he or she feared injury during the flooding. The third and fourth questions assessed, respectively, if the respondent feared a family member might suffer serious injury and if he or she feared a family member be killed during the flood. In addition, individuals estimated certainty with which they believed that their fears would be true. Questions were adapted from a study by Freedy et al. (1994) assessing similar life threat due to flooding.

Expectations of Flood Damage

Two items developed for the purpose of this study addressed the degree to which individuals expected, prior to the flood, that their own property and they community, as a whole, would be flooded.

Responsibility / Blame

A measure designed specially for the present study identified sources and degree of perceived responsibility / blame for the flooding or lack of flooding in targeted communities. Individuals were asked to respond by indicating on a five-point, likert-type scale (1= "not at all responsible", to 5 = "most responsible") who they believed was responsible for a) the flooding that did occur, and b) the flooding that did not occur. Choices available included 1) the National Weather Service, 2) the Army Corps of Engineers, 3) the media, 4) government officials, 5) flood-fighting volunteers, 6) local farmers, 7) God, 8) myself, personally, 9) no one/chance, and 10) other.

Modified Coping Strategies Inventory

For the purpose of the present study, an abbreviated version of the Coping Strategies Inventory (CSI; Tobin, Holroyd, Reynolds, & Wigal, 1989) created by Myers and Wittrock (1996) was used. The modified version included ten questions from the original, 72-item, full-scale CSI, with two subscales assessing engagement and disengagement strategies. Respondents indicated on a 5-point likert scale, ranging from "not at all" to "very much," the degree to which a number of coping statements was true for them. The five questions taken from the engagement subscale of the CSI have been found to have a coefficient alpha of .82, and the five questions taken from the disengagement subscale of the CSI have been found to have a a coefficient alpha of .80. (Myers & Wittrock; 1996).

Resource Loss

Resource loss was assessed using the 74-item Conservation of Resource-Evaluation (COR-E) developed by Hobfall et al. (1995). This scale lists a number of object resources (e.g., "adequate food"), energy resources (e.g., "money for 'extras'"), personal resources (e.g., "sense of optimism"), and social resources (e.g. "good marriage"). Individuals indicated the importance they ascribed to the resources on a scale from 1 to 7 ("little importance" to "great importance," respectively). In addition, respondents indicated which losses or gains were experienced since the flood from 1 to 7 ("great gain" to "great loss," respectively). Scores for the total amount of resources lost or gained and the importance of resources were summed separately. Sum scores across type of resources were also calculated. In addition, the product of the importance and

loss/gain values was summed across resource type, for a total score for all resource types to address the level of loss/gain for valued resources.

Alcohol Use Summary

Two questions developed for the purpose of the study assessed changes in the amount and frequency of alcohol consumed, as compared with the period of time prior to the flood. Respondents responded on a 7-point semantic differential ranging from 1 to 7 ("much less" to "much more," respectively).

Beck Depression Inventory-Short Form (BDI-SF)

The BDI-SF (Beck & Beck, 1972) is an abbreviated version of the Beck Depression Inventory (BDI; Beck, 1970). It contains 13 items on which respondents chose which of four statements best reflected the way they had been feeling during the most recent two weeks regarding common symptoms of depressed mood such as sadness, social withdrawal, and guilt. Higher scores were reflective of higher subjective feelings of depressed mood.

State-Trait Personality Inventory (STPI)

The STPI (Spielberger, Jacobs, Crane, Russell, Westberry, Barker, Johnson, Knight, & Marks, 1979) has three subscales assessing the constructs of state and trait anger, anxiety, and curiosity. The measure consists of a 60-item scale to which individuals respond by evaluating themselves on a 4-point semantic differential scale representing levels of general feeling. For the purpose of the present study, the trait forms were used, as the longer term effects of flooding on personal traits represented a more appropriate construct than the form assessing more transient and variable state-dependent statements. The subscale used to measure curiosity was not included. Ten

questions from the scale reflect endorsement of general feelings of anxiety (e.g., "I feel nervous and restless") and ten questions reflect endorsement of general feelings of anger (e.g., "I am quick tempered"). Higher scores reflect higher trait anxiety and trait anger. The trait anxiety and trait anger scales have both been found to have alpha coefficients ranging from .88 to .92 (Spieilberger et al., 1979).

Physical Symptoms Index

Physical symptoms of stress were assessed via the Physical Symptoms Index of the Health and Daily Living Form (Moos, Crokite, & Finney, 1990). This 12-item measure of psychologically related physical symptoms assesses such problems as weakness, poor appetite, and insomnia. Assessment of inter-item consistency within the measure reveals a coefficient alpha equal to .89 (Evans, 1997).

Procedure

Data collection within the two cities occurred concurrently between the dates of April 1, 1998, and July 6, 1998. Paper and pencil questionnaires were distributed by trained undergraduate research assistants. Targeted residence areas were chosen indiscriminately from addresses out of the Grand Forks/East Grand Forks telephone directories. For portions of the community chosen which were uninhabited or destroyed due to a high level of flooding, a FEMA trailer household was randomly chosen and surveyed. Research assistants went to the identified address, and asked for the primary adult resident of the home. Information was provided to the resident about the study. Only one questionnaire was distributed per household, and only individuals who were residents of the community during the flood were provided with the questionnaire. Those individuals interested in completing a survey on their experiences with the flood were

provided with a consent form. Participants were allowed to decline participation at any point prior to, during, or after distribution of the questionnaire. Those who chose to participate were then asked to complete the questionnaires in the survey (described above) during available free time, and to return the forms via the U.S. mail. The survey took approximately 45 minutes to complete. Respondents were provided with a stamped envelope addressed to the researcher in which to return their questionnaires after completing them. Participants were also given a stamped postcard to be mailed separately from the questionnaire, which could be returned for consideration in a drawing for gift certificates. All households were provided with information on mental health services available to flood victims in their respective communities, as well as general information on stress symptoms. After initial contact was made with the household chosen via the telephone book, the research assistants solicited additional adjacent neighborhood residences until four more adult residents were directly contacted, or ten households were approached in total (in cases where residents were not home), following the same procedures.

Research Design

Analyses included stepwise multiple regressions for predicting psychological distress across measures of anger, anxiety, depression, physical complaints, and alcohol use. Hierarchical multiple regression was used to assess the relative predictive abilities of individual types of resource loss (personal, condition, energy, object) for each outcome variable for which significant variance was accounted for in analyses by total resource loss. In addition, a 2 (Preparation: High v. Low) x 2 (Resource Loss: High v. Low) analysis of variance was used to assess the effects of pre-flood preventive behaviors and

resource loss on psychological functioning. Expectations of flooding for personal property and the community were used as covariates. A 2 (Preparation: High v. Low) x 2 (Resource Loss: High v. Low) analysis of variance was also used to assess the effects of pre-flood preventive behaviors and resource loss on attributions of responsibility for both flooding which did occur and flooding which was prevented. Dependent variables included ratings for each of ten separate targets such as government officials, God, or the Army Corps of Engineers.

High and Low Preparation Groups

Respondents were separated into either high preparation or low preparation groups. Grouping criteria was based upon a median split derived from the average individual mean z-scores of five indices of preparation, including total available money spent in flood preparation, total available time spent in flood preparation, percentage of available time spent in flood preparation, percentage of available money spent in flood preparation, and total number of preparatory acts. The z-scores from the five indices were averaged in an attempt to include the greatest number of respondents in subsequent analyses, given that only 43% of respondents completely answered the items on all indices. Each index of preparation was equivalently weighted, such that no completed index was more or less important than any other completed index of preparation in determining high and low preparation groups.

Results from independent samples t-tests indicate that grouping techniques differentiated high and low preparation groups across each of the five separate preparation indices. Participants in the high preparation group spent, on average, $250 in flood preparation, with ranges from $0 to $45,000. This is significantly more than the

amount spent by those in the low preparation group, whose monetary expenses ranged from $0 to $2000, but averaged only $86.12 (median = $0) in preparation expenses, t (1, 240) = -2.41, p < .05. In addition, individuals in the high preparation group reported spending more of their total available monthly resources for available flood preparation than did those in the low group, t (1, 225) = -6.13, p < .01. Respondents in the high preparation group reported spending an average of 22.35% (Mdn = 9) of their available income to flood-fighting efforts, whereas those in the low preparation group spent only 4.12% of their average available income (Mdn = 0).

High and low preparation groups also significantly differed on their estimated number of hours spent in flood preparation efforts, t (1, 264) = -9.97, p < .01. Those in the high preparation group reported spending a mean of 119.04 hours in flood preparation activities (Mdn = 72), whereas respondents in the low preparation group reported spending an average of 21.8 hours (Mdn = 16). Groups also differed in the reported percent of total monthly available time spent in flood-preparation activities, t (1, 250) = -9.66, p < .01, with the high preparation group reporting a mean of 47.5% (Mdn = 50%) of estimated available time in preparing for the flood and the low preparation group mean of 14.5% (Mdn = 5%) of estimated available time in such efforts. Individuals in the high and low preparation groups did not significantly differ in whether they were displaced from their homes, X^2 (1, N = 304) = 1.40, p >.05, nor in the length of time in which they were displaced, t (273) = -1.46, p >.05. The high preparation group was displaced an average of 69.2 days (Mdn = 30), while the low preparation group was displaced an average of 52.3 days (Mdn = 28).

Individuals in the high preparation group were more likely to have engaged in a higher number of flood preparation activities (M = 4.97) than were those in the low preparation group (M = 2.25), t (1, 300) = -19.75, p < .01. Chi-square analyses revealed that high and low preparation groups differed significantly in individual preparation behaviors for all types of preparatory acts, (p < .001), with the exception of assistance in food preparation, X^2 (1, N = 304) = 2.18, p >.05. However, independent t-tests suggested that groups did not differ in the total amount of time or money spent in any one preparatory behavior, with the exceptions of amount of time spent filling sandbags for the community, and in the amount of time spent building dikes in the community, t (1,123) = -2.36, p < .05. Number and percent of respondents who reported individual types of flood preparatory behaviors are listed in Table 2.

Data analyses suggested that high and low preparation groups differed in the extent to which they reported fearing they or their families would be injured or killed would be killed X^2 (1, N = 298) = 11.77, p <.05, or injured, X^2 (1, N = 303) = 13.98, p <.05, during the flood than was the low preparation group. In addition, the high preparation group reported more fear that family members would be injured X^2 (1, N = 304) = 17.4, p <.05, or killed, X^2 (1, N = 303) = 9.17, p <.05, during the flood.

Nonparametric statistics were also conducted to assess the independence of demographic variables across the low and high preparation groups. Analyses revealed that the groups did not differ in their ethnic affiliation, X^2 (6, N = 300) = 6.53, p >.05, age, t (302) = -1.71, p >.05, number of children living in the home, t (297) = -1.05, p >.05, or level of education, t (292) = -1.23, p >.05. However, they did significantly

Table 2. Respondent Pre-Flood Preparation Behaviors

	Low Preparation		High Preparation	
	N	%	N	%
Bought flood insurance	15	9.9	52	34.2
Mean/median dollars spent	278.36 / 245		372.91 / 321.5	
Bought generators	3	2.0	28	18.4
Mean/median dollars spent	200 / 200		955 / 600	
Bought pumps	27	17.8	68	44.7
Mean/median dollars spent	136.19 / 100		182 / 100	
Moved personal property to higher ground	81	53.3	128	84.2
Mean/median hours spent	9.38 / 4		8.6 / 5.0	
Helped community members/ neighbors move personal property to higher ground	61	40.1	97	63.8
Mean/median hours spent	10.44 / 4		8.5 / 5	
Filled sandbags for personal property	9	5.9	53	34.9
Mean/median hours spent	12.33 / 7.5		20.24 / 10	
Filled sandbags for community members/neighbors	88	58.3	129	84.9
Mean/median hours spent	13.82 / 10		24.45 / 12	
Built dikes around personal property	4	2.6	38	25
Mean/median hours spent	9.3 / 3		15.2 / 10	
Built dikes around community/neighbors' property	59	38.8	101	66.4
Mean/median hours spent	13.42 / 9		22.16 / 12	
Acted as a "dikewalker" for community	9	5.9	33	21.7
Mean/median hours spent	13.42 / 9		14.4 / 6	
Assisted with transportation for flood fighting volunteers	6	3.9	29	19.1
Mean/median hours spent	2 / 2		24.57 / 22	
Assisted with preparing food for flood fighting volunteers	23	15.1	33	21.7
Mean/median hours spent	8.89 / 6		8.63 / 5	
Total Mean/median preparation acts	2.24 / 2		4.97 / 5	

differ on other demographic variables. Specifically, women represented a higher proportion of the low preparation group (68.4%), whereas men represented a higher proportion of the high preparation group (55.3%), X^2 (1, N = 302) = 17.3, p <.05. Individuals who rented their residences made up a larger proportion of the low preparation group (30.9%) than the high preparation group (14.0%), X^2 (1, N = 275) = 11.32, p <.05. Marital status was also differentially represented for the two loss groups, X^2 (4, N = 302) = 19.4, p <.05. Furthermore, the high preparation group reported significantly greater income levels than did the low preparation group, t (292) = -5.21, p <.05. The implications for differences among high and low preparation groups will be addressed further in the discussion section.

High and Low Resource Loss Groups

Individuals were categorized into either high or low resource loss groups, based upon median split of the mean overall resource loss scores from the COR-E. Nonparametric statistics were conducted to determined whether low and high resource loss groups significantly differed on the demographic variables. Analyses revealed that the groups did not differ in gender, X^2 (1, N = 297) = 3.72, p >.05, marital status, X^2 (4, N = 297) = 3.06, p >.05, residential status (own versus rent), X^2 (1, N = 271) = 0.07, p >.05, or ethnic affiliation, X^2 (6, N = 297) = 7.22, p >.05. Furthermore, the resource loss groups did not differ in their age, t (297) = 1.22, p >.05, education, t (287) = -0.81, p >.05, household income, t (287) = -0.39, p >.05, or number of children living in the home, t (293) = 1.42, p >.05. Groups did not differ in whether they were displaced from their homes, X^2 (1, N = 299) = 1.37, p >.05, but did differ in the length of time for which

they were displaced, t (269) = 1.82, $p >.05$. The high loss group was displaced an average of 71.25 days (Mdn = 30) and the low loss group was displaced an average of 49.90 days (Mdn = 24).

High resource loss groups did not differ from low resource loss groups on the extent to which they feared they would be injured X^2 (1, $N = 298$) = 1.91, $p >.05$, or killed X^2 (1, $N = 294$) = 0.37, $p >.05$, during the flood, or the extent to which they feared that their families would be injured X^2 (1, $N = 299$) = 0.21, $p >.05$, or killed X^2 (1, $N = 298$) = 0.20, $p >.05$.

RESULTS

The Association between Predictor and Outcome Variables

Forward stepwise multiple regression analyses were performed using the resource

loss / value variable and simple resource loss as predictors of the dependent variables.

Neither of the variables were able to predict a significant portion of variance for the

anger, or for amount or frequency of alcohol use, $p > .05$. Simple resource loss was a

significantly better predictor of dependent variables, accounting for a greater portion of

variance than did the value weighted resource loss predictor for anxiety, depression, and

somatic complaints. Implications of this with respect to the predictions of the COR

model will be further addressed in the discussion section. It is important to note

(although not surprising) that high tolerance in the value weighed resource loss predictor

(greater than .027 for each variable) suggests a high degree of multicolinearity. Given the

better predictive ability of simple resource loss over the value weighted resource loss,

simple resource loss was used in all subsequent analyses rather than value weighed

resource loss. Table 3 presents the correlational data for both simple resource loss and

value weighted resource losses.

Further analyses of the COR-E would suggest a high level of internal consistency

(alpha = .9643) for overall resource loss. Furthermore, there was a high degree of

internal consistency for object resource losses, personal resource losses, energy resource

losses, and condition resource losses (alpha = .8742, .9222, .8874, and .8824,

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respectively). All four resource loss variables were highly correlated with the other three

resource categories (p < .001).

Table 3. Correlations and Probabilities for Resource Loss and Value Weighted
Resource Loss

Outcome Variable	Resource Loss	Value x Resource Loss
Anger		
r	.0998	.0957
p	.09	.10
Anxiety		
r	.3021	.2956
p	<.001	<.001
Depression		
r	.4078	.3919
p	<.001	<.001
Somatic Complaints		
r	.3498	.3492
p	<.001	<.001
Alcohol use		
Frequency		
r	-.0542	-.0387
p	.35	.51
Amount		
r	-.0217	.0023
p	.710	.969

It was expected that there would be a strong positive correlation between the four

types of resource loss and variables of alcohol use, anger, anxiety, depression, and

somatic complaints. Table 4 presents these correlational data. Although this was true of

depression, anxiety, and somatic complaints, there was no relationship between resource

loss variables and anger or alcohol use.

Table 4. Correlations of Individuals' Types of Resource Loss with Dependent Variables

	Type of resource loss			
Dependent variable	Object losses	Energy loss	Condition loss	Personal loss
Anger	.04 ($p = .41$)	.07 ($p < .001$)	.10 ($p = .07$)	.11 ($p = .05$)
Anxiety	.13 ($p = .02$)	.24 ($p < .001$)	.30 ($p < .001$)	.35 ($p < .001$)
Depression	.22 ($p < .001$)	.34 ($p < .001$)	.37 ($p < .001$)	.46 ($p < .001$)
Somatic Complaints	.28 ($p < .001$)	.37 ($p < .001$)	.24 ($p < .001$)	.32 ($p < .001$)
Alcohol	-.05 ($p = .37$)	-.04 ($p = .42$)	-.03 ($p = .56$)	-.02 ($p = .73$)

Table 5 indicates that the level of correlation between each of the outcome variables was also quite high ($p < .001$), with the exception of the alcohol use variables ($p > .05$).

Table 5. Correlations Between Dependent Variables

	Anger	Depression	Alcohol use	Somatic complaints
Depression	.41			
Alcohol use	.00	-.02		
Somatic Complaints	.28	.58	-.05	
Anxiety	.52	.70	.02	.58

Predicting Distress

It was hypothesized that overall resource loss would be of greater importance in accounting for variance in dependent variables than would demographic variables, coping

style, or threat (of injury or death in self or others). Demographic variables included age, household income, marital status, gender, ethnicity, and education. Forward multiple regression analyses were conducted for each dependent variable. The relative importance of each predictor variable was determined by examining the significance of the beta weight associated with each outcome variable. Beta weights indicated the relative strength of each predictor variable by expressing the unique variance of each variable while controlling for the other predictors within the model.

Contrary to expectations, age (β = -.31, p < .001), threat of death (β = .14, p < .001), and coping style (β = .15, p <.01) were significant predictors of anger, accounting for a total of 14% of total variance, $F(3, 272)$ = 16.18, p < .001. Younger individuals were more likely than older individuals to experience anger (r = -.31). Those individuals who had greater fears they would be killed during the flood were more likely to experience anger than were those who were not as fearful for their lives (r = .17). Individuals who use internal coping styles experienced higher levels of anger than those who used external coping strategies.

Analyses suggested that style of coping best predicted anxiety (β = -.28, p < .001), followed by resource loss (β = -.23, p < .001), threat of death (β = .22, p < .001), gender (β = .15, p < .01), and age (β = -.13, p < .05), which combined to account for 26% of the variance, $F(5, 272)$ = 20.08, p < .001. Individuals who use internally-based coping strategies reported experiencing higher levels of anxiety than did those who use externally-based coping strategies. The extent to which individuals feared for their lives was also highly correlated with anxiety (r = .25). Women were more likely to experience

anxiety than were men. Younger individuals reported greater levels of anxiety than did older individuals (r =.15).

Resource loss accounted for a significant portion of variance and represented the best predictor of depression (β = -.35, p < .001), followed by coping style (β = -.21, p < .001), threat of death (β = .22, p < .001), and gender (β = .16, p < .01), all of which combined to explain 27% of the variance in depression scores, F = 26.98, p < .001. Individuals with internal coping mechanisms endorsed higher levels of depression than did those who utilized external coping mechanisms. Individuals who reported experiencing a higher threat of death from flooding reported higher levels of depression than did those who reported experiencing less threat of death (r = -.25). Women reported endorsed more depressive symptoms than did men.

Finally, resource loss was the best predictor of physical complaints (β -.30, p < .001), followed by gender (β = . 20, p < .001) and coping style (β = .16, p < .01), which together accounted for 17% of the variance, F (3, 276) = 19.4, p < .001. Women endorsed more somatic problems than did men. Individuals using internal coping mechanisms reported had more physical complaints than did those who utilized external coping mechanisms.

No single variable accounted for a significant portion of variance for either frequency of alcohol use or amount of alcohol use, p <.05.

Predictive Ability of Specific Resource Losses

Separate hierarchical multiple regressions were used to test the ability of the four types of resource loss within the COR model to predict anxiety, depression, and somatic

complaints. As anger and alcohol use were not predicted by the COR model as a whole

in previous multiple regression analyses, these were not included in follow-up analyses.

Separate regressions were conducted with each of the three psychological outcome

variables as the dependent variables. Due to a lack of published information on the

relative importance of each of the COR variables in predicting post-disaster distress, the

model for predicting distress was determined by considering what is known about the

variables addressed in the COR model, and by what was known about the current

disaster. First, because personal resources are central to how individuals perceived not

only their environment, but how they perceive themselves, it was hypothesized that this

would be the best predictor of performance on distress measures. Energy resources, (e.g.

time and money) were felt to be important because of the level of damage done to

affected communities, and the amount of energy used by community members in pre-

flood prevention. As such, in the case of the Red River flood, this was hypothesized to

be the next strongest predictor of distress. Object resources were predicted to account for

the third largest portion of variance. Due to the separation from or destruction of

personal items experienced by many individuals for extended periods of time, it would be

expected that object resources would be associated with distress. Because of the relative

surprise of the evacuation and subsequent flooding, few people had adequately protected

valued objects or had the means or time to gather and bring them to emergency shelters.

However, given the length of time elapsed between the actual flood and the survey, these

would have represented a resource which may have been more easily recouped than

personal or energy resources. Finally, condition resources were chosen as the least

important predictor of psychological outcome, given the sense of community that many flood victims found in places such as shelters.

The regression analyses indicated that overall resource losses accounted for 14.8% of the variance in physical symptoms, $F(4,292) = 12.69$, $p < .001$, 14.2% of the variance in anxiety symptoms, $F(4,287) = 11.92$, $p < .001$, and 23.2% of the variance in depressive symptoms, $F(4,291) = 22.0$, $p < .001$. As shown in Table 6, personal loss accounted for a significant amount of variance in physical symptoms, $\beta = -.21$, $p < .05$, anxiety, $\beta = -.31$, $p < .01$, and depression, $\beta = -.45$, $p < .001$. Energy losses accounted for a significant amount of variance in physical symptoms, $\beta = -.28$, $p < .01$, and depression, $\beta = -.19$, $p < .05$, but not for anxiety. Object resources accounted for a significant portion of variance for anxiety, $\beta = .23$, $p = 01$, and depression, $\beta = .21$, $p = .01$, but not for physical problems. Last, condition losses did not account for a significant amount of variance for any of the outcome variables.

Table 6. Summary of Regression Analyses for Resource Loss Subtypes

	Outcome Variable		
Predictor Variable	Physical Symptoms	Anxiety	Depression
Personal loss β	-.2120*	-.3116*	-.4451**
Energy loss β	-.2826*	-.1466	-.1871*
Object loss β	.0009	.2259*	.2132**
Condition loss β	.0985	-.0936	-.0245
R	.38	.38	.48
R²	.15	.14	.23
F	12.69**	11.92**	22.01**

* p<.05.   ** p<.001

Overall, the data suggests that the specific type of resource loss consistently most predictive of overall psychological distress (physical complaints, anxiety, and depression) for this population was personal resource loss (average $\beta = -.32$). Energy resource loss was the next best predictor of distress in this study (average $\beta = -.21$). Object losses accounted for the third most overall predictive variance (average $\beta = .15$), with condition losses coming in a distant fourth place in its predictive ability (average $\beta = -.07$).

Assessment of Preparation and Resource Loss Effects

The second hypothesis of the current study focused on the extent to which individuals who had engaged in preparatory behaviors and the amount of resources lost by those individuals would be related to overall maladjustment. It was expected that individuals with high levels of pre-flood behaviors aimed at averting resource loss, but who had high levels of resource loss (high preparation/high loss) after the flood would report the highest levels of overall psychological distress. Individuals who had low levels of preparation and who experienced low levels of resource loss (low preparation/low loss) would demonstrate the lowest level of overall psychological distress. Individuals who either prepared much and lost little (high preparation/high loss), or those who had prepared less, but had lost many resources (low preparation/high loss) would represent intermediary levels of psychological distress.

Separate 2 x 2 analyses of variance (ANOVA) were conducted to assess whether resource loss and preventive behaviors affected self-reported anger, anxiety, depression, alcohol use (amount and frequency of use), and somatic complaints. As it would be expected that individuals who were anticipating flooding would be more likely to engage

in preparatory behaviors, expectation of flooding of personal property and expectation of flooding in the community were used as covariates in analyses.

Results indicated that there was no significant interaction between resource loss and preventive behaviors for depression, $F (1, 289) = 2.18$, $p > .05$. However, there was a significant main effect of resource loss, $F (1, 289) = 34.11$, $p < .001$. Individuals who reported high levels of resource loss received an average score of 5.5 on the BDI-SF, whereas individuals with low levels of resource loss received an average score of 2.5 on the measure.

There was no significant interaction between loss and preparation for anxiety, $F (1, 285) = 3.34$, $p > .05$. There was a significant main effect of resource loss, $F (1, 289) = 13.77$, $p < .001$, with individuals in the high resource loss group receiving a mean score of 8.9 on the STPI anxiety measure, and individuals in the low resource loss group receiving a mean score of 6.6 on the measure.

There was a significant interaction between loss and preparation for anger, $F (1, 284) = 7.54$, $p = .006$. Further analysis of simple effects show that high preparation/high loss groups reported significantly more anger $(X = 7.44)$ than did individuals in the high preparation/low loss group $(X = 5.47)$, $t (145) = -2.62$, $p = .010$, or the low preparation/high loss group $(X = 5.45)$, $t (146) = 2.70$, $p = .008$. Results are indicated in graphical form in Figure 1.

There was no significant interaction between loss and preparation for physical complaints, $F (1, 290) = 0.16$, $p > .05$. Again, there was a significant main effect of
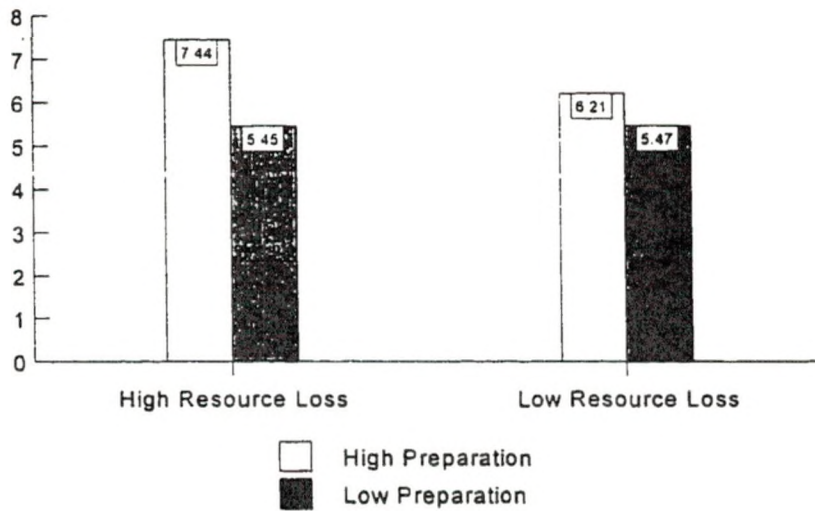
Figure 1. Mean anger scores as a function of overall resource loss and preparation

resource loss, F (1, 289) = 13.77, p <.001, with individuals in the high resource loss

group receiving a mean score of 13.4 on the PSI and individuals in the low resource loss

group receiving a mean score of 8.9 on the measure.

There was no significant interaction between either frequency of alcohol use,

F (1, 290) = 0.00, p > .05 or amount of alcohol use, F (1, 289) = 0.25, p > .05. However,

there was a significant main effect of preparation for frequency of alcohol use, F (1, 289)

= 4.20, p > .04, with individuals in the low preparation group indicating a greater increase

in frequency of their alcohol consumption as compared to the high preparation group,

who indicated a slight decrease in the frequency of their consumption of alcohol.

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As individuals with higher residential damage returned surveys earlier than those with lower levels of residential damage, X^2 (2, N = 251) = 7.15, p <.05, and the Grand Forks residents returned surveys later than the East Grand Forks residents, X^2 (1, N = 251) = 36.61, p < .001, there was a concern that differences in the date of response across these groups might confound results given that research suggests that psychopathology has been found to decrease over time (Rubonis & Bickman, 1991). As such, post hoc analyses were conducted to assess for differences on outcome measures for respondents mailing in questionnaires earlier (prior to May 11, 1997, the median return date) versus later (May 11, 1997 or later), when level of residential damage was accounted for. Analyses did not indicate significant differences for any outcome measure, p >.05.

Attributions of Responsibility for Flood Prevention Response Outcomes

Two (resource loss: high v. low) by two (preventive behaviors: high v. low) analyses of variance (ANOVA) statistics were used to determine the extent to which identified targets were responsible of preventing the flood damages in those portions of the community which were less affected by the disaster, or the extent to which they blamed targets for the flooding and flood damages that actually occurred.

Attributions of Responsibility for Successful Flood Prevention

Results obtained by ANOVAs on attributions of responsibility for prevention of flooding in unaffected area indicated that there was a significant interaction between preparation and resource loss for government officials, F (1, 284) = 9.68, p = .03. Analyses of simple effects suggested that individuals who had high levels of preparation and high levels of resource loss considered government officials to be more responsible

(X = 3.07) for preventing flooding in less-affected areas than did individuals with low

levels of preparation, for both high (X = 2.26), t (145) = 3.2, p < .05, and low (X = 2.48),

t (141) = -2.32, p <.05, levels of losses. No other interactions were significant, p > .05.

There were also significant main effects of preparation for the tendency to attribute

successful prevention of flooding to government officials and to the respondent,

personally. The high preparation group attributed significantly greater responsibility for

successful flood prevention to government officials (X = 2.89) than did those in the low

prevention group (X = 2.35), F (1, 281) = 9.7, p <.001. Individuals in the high

preparation group also saw themselves as more responsible for preventing flooding (X =

1.43) than did those who were in the low preparation group (X = 1.23), F (1, 284) = 6.1, p

<.05.

Attributions of Responsibility for Unsuccessful Flood Prevention

Results of the ANOVA on attributions of responsibility for flooding in affected

areas suggested no significant interactions between preparation and loss, p > .05. In

addition, there were no significant main effects for either preparation grouping or loss

grouping in individuals' tendencies to blame the Army Corps of Engineers, the media,

volunteers, farmers, God, themselves, no one/chance/ or others, p > .05. However, there

was a significant main effect of preparation for blaming the National Weather Service and

government officials. Individuals in the low preparation group were less likely to suggest

that the National Weather Service was responsible for flooding (X = 3.11) than were

individuals in the high preparation group (X = 3.34), F (1, 285) = 4.5, p <.05. Individuals

in the low preparation group were less likely to suggest that the government was

responsible for flooding (X = 2.39) than were individuals in the high preparation group

(X = 2.85), $F(1, 289) = 7.4$, $p < .05$.

DISCUSSION

Natural disasters commonly result in widespread psychological distress for survivors, this distress may last months or even years after the actual event. Research has begun to focus on predicting which victims will demonstrate the greatest levels of pathology. The Conservation of Resources (COR) model provides a new variable (total resource loss) that has promising utility in prediction of psychological distress, having been found to be a robust predictor of anxiety, depression, post-traumatic symptoms, and somatic complaints for different types of disasters. The current study sought to assess the utility of the COR within the context of the 1997 flood of the Red River in Grand Forks, ND, and East Grand Forks, MN. In general, the study confirmed the importance of considering resource loss in the study of adjustment to natural disaster. Resource loss was found to be a better predictor than demographics or life threat variables in predicting the outcomes of depression, anxiety, and somatic complaints. Specifically, resource loss was the strongest predictor of two of five dependent variables, i.e., somatic complaints and depression. It was the second best predictor of anxiety, after coping style. In addition to statistical significance of the findings, the measure also appears to have adequate clinical significance in its ability to differentiate between those who have clinically elevated levels of depression, anxiety, and physical complaints. On the depression measure, 10.9% of the high loss group respondents reported clinically elevated scores, whereas only 2.0% of the low loss group respondents scores were in the clinically significant

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range. On the anxiety measure, 9.7% of respondents in the high loss group were in the clinically significant range, compared with 3.4% of those in the low loss groups. Similarly, 11.6% of individuals in the high loss group responded in the range of clinical significance for physical problems, with only 2.7% of those in the low loss group responding within this range.

Resource loss did not account for a significant portion of variance for either anger or alcohol use. Younger individuals, those who feared they would be killed during the flood, and those who utilized internal coping styles experienced the highest levels of anger. No other variable included in analyses was able to account for a significant portion of variance in either of the measures related to alcohol use. However, other research focusing on the validity of the COR model has not identified relationships between resource loss and anger or alcohol use. This would suggest that although there may be an increase in use of alcohol and feelings of anger after a natural disaster, these are not directly associated with specific resource loss. Overall, replications made in this study strengthen the COR model's place in disaster research, and would suggest that this variable has utility in future studies, when used to predict anxiety, depression, and physical complaints.

Analyses of the COR-E

The current study expanded on previous research on the COR model in two major ways. First, the present study utilized an expanded measure of resource loss which weighted different resources by their subjective value to the victims. Second, it sought to identify which specific types of resource loss were most predictive of pathology. It was expected that this new measure would be a better predictor of psychopathology than the

original measure, which only assessed the extent to which various resources were gained or lost. However, the value of resources which were lost did not predict pathology better than did resource loss alone. This would suggest that how much a person loses may be more important than the extent to which an individual values what is lost in a natural disaster, and that it is unimportant to assess subjective value of those resources.

As value of losses have not been addressed in previous research on the COR, we are unable to discuss results within the context of previous findings. Therefore, it may be useful to theoretically examine why the findings were discrepant with the hypothesis that assessing the value of resources would add to the predictive ability of the COR model. Theoretically, findings may be explained under the premise of cognitive dissonance theory (Festinger, 1957). Cognitive dissonance theory would suggest that an individual who behaves in ways which are inconsistent with his or her beliefs will experience dissonance, and will behave in ways to justify his or her behaviors that have been inconsistent with his or her values. In this way, it may be that individuals who lost valued resources would be less likely, retrospectively, to state that they valued those resources in the first place. Devaluing resources would reduce the dissonance (and subsequently, the distress) experienced from the knowledge that they were unable to save those resources of highest value.

Another explanation of null findings might relate to the amount of variability in response for the value-oriented statements and demand characteristics of these. If the variability in the value scale was too low, it might have affected the statistical significance of findings. Respondents indicated on a 7-point semantic differential ranging from "no importance" to "great importance." Resource loss was also on a 7-

point semantic differential. It might be argued that very few participants would indicate that resources on the list were of little value, and even fewer would state that they were of "no importance" at all, given that the list is made up of resource commonly valued in our society. For example, indicating that "children's health," is unimportant may not be consistent with one's self perception as a caring parent, nor would one wish for others (i.e., the researchers) to believe that he or she did not value their children's health as a resource. However, the variance in resource loss was .29, and the variance in value of the indicated resource was .73. This would go against the argument about lack of variability and response bias affecting the statistical results.

A final consideration for results discrepant with they hypothesis is that the time elapsed between the flood and the date of the survey affected the subjective value of lost objects. Over time, the loss that was felt by losing one's car, for example, may have lessened as the individual found alternative means of transportation, replaced the lost vehicle, or changed their perspective on the importance of a car in comparison with other resources.

The second way in which the present study expanded on what is known about resource loss as a predictor of distress had to do with the different types of resource loss represented by the measure, including personal resources, condition resources, object resources, and energy resources. The finding that all four resource loss variables were highly correlated adds strength to the theory that resources tend to be highly interrelated, and that diminishing resources in one category of resources can lead to further loss in other resource categories. In addition, consistent with expectations, personal resource losses explained the greatest amount of average variance across the three variables for

which resource loss was a significant predictor, with the highest proportion for the variables of anxiety and depression. This would suggest that if a disaster victim loses qualities that are seen as central to the self, these losses will continue to affect psychological functioning over extended periods of time. It is important to note that this finding may reflect the content of the statements regarding personal resources on the COR-E. There is similarity between items addressing losses such as hope and a feeling of success and those items on the depression and anxiety scales. Furthermore, these rather subjective assessments of personal thoughts or feelings may have primed or influenced how individuals responded to items on the depression and anxiety scales later in the survey. As hypothesized, the second type of resource best predictive of overall psychological dysfunction, and the variable best predicting somatic problems was energy resources. Energy resources also accounted for lesser, but still significant portion of the variance for depression. This would suggest that time, money, and other energy-related resources are necessary in dealing with the stress of a disaster, especially in dealing with the somatic complaints and dysphoria that individuals often experience afterward. In addition to the physical manifestation of stress (e.g., headaches, indigestion) on individuals, it might also be that respondents had limited time and money to actively seek out medical care when necessary. Regarding the two best predictors of overall distress in this study, personal and energy resources, once depleted, may be harder to replace than object or condition resources, and therefore better predict overall maladjustment. Object resources explained more variance across the three dependent variables than did condition resources, and explained a significant portion of variance of both anxiety and depression. Lastly, condition resources explained no significant variance of any of the three outcome

variables. Condition resources were not expected to contribute as much variance as the other predictors, given the sense of community that flood victims likely found not only in shelters immediately after the flood, but in the group cleanup and community restoration that followed over the course of the following year.

Given these findings, a major goal of disaster recovery programs should be to assist individuals in restoring lost resources. The results would suggest that searching out those individuals with the greatest amount of loss in object resources, such as home or personal property, may not be a sufficient means of identifying those most in need of mental health services. Results indicate that it may be also be important to target post-disaster services to those individuals who have lost personal attributes or energy resources. Considering the degree to which an individual's personal life has been disrupted, and the extent to which he or she has exhausted his or her savings, credit, or available time appears to be very important when determining the need for services.

Assessment of Preparation on Psychopathology

A second hypothesis of the current study examined the interaction between preventive behaviors and resource loss in predicting anger, anxiety, somatic complaints, depression, and alcohol use. Contrary to expectations, individuals with high levels of pre-flood preventive behaviors and high levels of resource loss did not experience more overall pathology than did those who engaged in less preparatory behaviors for any variable except anger. However, for anxiety, depression, and somatic complaints, there was a main effect for resource loss. Consistent with earlier analyses, high resource loss was associated with these variables. There was also a significant main effect for preparation for alcohol use, with individuals in the low preparation group indicating a

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greater increase in frequency of their alcohol consumption as compared with those who were in the high preparation group. These results would argue against the COR model's conclusion that individuals use up available resources by the very action of protecting their resources, and thus have less resources available and experience higher psychopathology than if they had not engaged in these behaviors. As this was the first study to address this issue, it would be useful to replicate these findings in future research, especially if measures of pre-disaster preparation can be assessed closer in time (or even prior) to the actual disaster than was possible in the current study.

There was a significant interaction between loss and preparation for the anger variable, consistent with the hypotheses. Given the inability of the COR to predict other types of pathology, it may be useful to examine alternative reasons for this interaction. It may be that individuals become angry when they have spent significant time and money protecting their resources and still lose many of them. On the other hand, individuals who have not expended such effort might rationalize their losses. Cognitive dissonance theory may again explain the change in attitude consistent with behavior. That is, "if I did not prepare, I shouldn't feel angry about what I lost." In addition, individuals who spent much time preparing for flooding and felt rewarded for this preparation by receiving relatively low losses of their resources would have little reason to feel angry about their situation.

It was expected that, among individuals experiencing low resource losses, responsibility would be attributed to the self for preventing losses in the communities where flood prevention efforts were successful, and to others (e.g., God, Army Corps of Engineers) for their inability to prevent flooding in highly damaged communities.

Similarly, individuals who had high preparatory behaviors would see themselves as more responsible for flood prevention, and see others as responsible for the flooding that occurred in highly affected communities. Results provided mixed support for the hypotheses. Individuals in the high preparation group did see themselves as more responsible for preventing flooding than did those who were in the low preparation group. However, they also rated government officials as more responsible for prevention of flooding than did those in the low prevention group. In addition, individuals in the low preparation group were less likely to suggest that the National Weather Service and the government were responsible for flooding than were individuals in the high preparation group. That resource loss was not specifically associated with either attributions of responsibility for successful or unsuccessful flood prevention would suggest attitudes about who did or did not do enough during the flooding was not related to how much individuals lost because of the flooding. However, the act of engaging in preparatory behaviors was related to attributions of responsibility, suggesting that the act of engaging in such activities provides individuals with a basis from which to assess whether they and others did what they could to affect the consequences. It is noteworthy that individuals in the high preparation group rated government officials as more responsible for flood prevention than did those in the low preparation group. It may be that the high preparation group represented more individuals who worked in the various government positions highly involved with flood preparation (e.g., highway, fire, or police departments). It may be as well that these individuals worked along side such individuals, and recognized their contribution. In addition, the term "government official" may have been ambiguous, with some associating this term with politicians and

bureaucratic officials, while others may have associated this term with professionals such as police officers.

. Limitations of the Current Study and Implications for Future Research

One major limitation of the current study was that individuals in the two communities did not respond equally, nor did individuals with differential levels of residential damage. Although it might be expected that individuals with higher residential damages might be less willing to spend the time responding to questions about their losses, such a differential might have affected the outcome of the study by lack of a truly random sample. Similarly, the smaller community of East Grand Forks had a higher return rate than did Grand Forks, despite the fact that East Grand Forks had generally higher levels of residential damage. In addition, the high and low preparation groups differed on a number of demographic variables, including gender, home ownership status, and income. It is not surprising that individuals with higher incomes and who owned their homes were engaging in more flood prevention, given that these individuals had more to lose in the flood than renters or those with lower incomes. Differences in preparation between men and women may reflect the fact that many items included as preparation acts were highly physical. Furthermore, the measure did not include an item addressing child care. It is likely that many women were involved less directly by assuming greater roles in child care or household maintenance. Doing these activities may have allowed for men to more freely engage in direct flood prevention activities. It may be useful for future research to broaden the definitions of "preparation," and to using matching techniques to ensure greater equivalence. However, as none of the differential demographic variables was highly associated with any dependent measure, it may be

assumed that these sample differences did not significantly affect the overall outcome of the results.

Another limitation of the current study is that it utilized broke down resource loss categories into "high" and "low," and preparation categories into "high" and "low." Although median split techniques were useful in differentiating groups for the statistical analyses employed, such techniques do not allow for addressing the variability within the categories. For example, as all respondents in the "high" resource group are treated equivalently, little can be determined about the range of responses as the related to outcome variables. As such, the complexity of information that can be derived from the continuous measures is compromised.

There were several other limitations to the present study regarding the timing of data collection. First, there was no opportunity to gain pre-flood measure of psychological adjustment and no control community. However, given the nature of the flooding, pre-flood measure were not possible to collect. Because no pre-flood measures were taken, this study did not have the greater control that pre/post designs entail. This may have been partially countered by including an "unaffected community" against which to compare the flooded communities. However, neighboring communities differed in their population, threat of flooding, socio-economic status, and other uncontrollable variables, making such a "control" community implausible. Furthermore, media exposure regarding the flood might have differentially affected the responses of comparison communities.

Second, the study utilized retrospective estimates of preventive behaviors, expectations, losses, and value of resources lost. Because of this, there is a potential that

individuals may have been biased by their experiences and attitudes. If possible, future research would benefit from addressing such issues by comparing responses of individuals both prior to the disaster and after the event.

Another potential limitation of the study is that no measures of pathology were administered until a year after the actual flood. In fact, respondents were surveyed between 12 and 16 months after the actual flood. Although research would suggest that disasters have long-term effects, the degree to which these may have alleviated cannot be determined. However, there were no significant differences across outcome measures for those who returned surveys earlier versus later. This would suggest that overall levels of pathology at the time of the survey represented a fairly stable pattern of psychological dysfunction among respondents. This would validate the long-term emotional consequences of natural disasters. However, it would be useful to resurvey respondents over a more extended time to assess ongoing symptoms.

A further limitation of the present study has to do with sampling methods. Research assistants did not utilize random numbers tables to identify pages or names in the phone book, but arbitrarily selected addresses. In addition, after a contact was made this way, research assistants went to up to four adjacent residences, rather using the phone book technique for all targeted residences. The purpose of clumping solicited residences was to save time, but further compromised the process of randomization. In addition, as there were many individuals who had moved, it was impossible to gain a truly random sample of those individuals who had been living in the community at the time of the flood. Individuals who had moved from the community may be been accrued more

losses, and were not sampled. It may be important for future research to address these issues.

The return rate of the surveys was somewhat low (34.6%). At the time of the study, many members of the communities were continuing to rebuild their homes, businesses, and communities. Those with high losses, particularly, may not have had time to complete the survey, or did not wish to be reminded of their losses. It is reasonable to assume that completing the somewhat lengthy survey was not a priority for many potential respondents. However, this limitation is of relatively minimal importance, given that findings are generally consistent with the general disaster literature.

Finally, the scope of information collected was limited to demographic characteristics, preventive behaviors, coping styles, and resource loss. Other variables may have been useful predictors of psychological distress, such as prior history of traumatic experiences. That alcohol use was not found to be predicted by the variables, but was in other disaster research (Logue et al., 1979) is also of note. The two simple questions assessing changes in the frequency and amount of alcohol use may not have accurately reflected alcohol problems in the individuals surveyed. It may be that other better validated measures of alcohol use may have reflected greater effects.

Furthermore, the measure of resource loss has not been thoroughly evaluated with regards to its psychometric properties. Abbreviated measures assessing resource loss (without consideration of potential gain or subjective value of resources) including 32 items from the longer version of the scale used by Freedy et al. (1992) do evidence adequate internal consistency for the four subscales (alphas between .80 and .86) (Evans,

1997). However, with the exception of data presented in the current study, there is no published information as to the validity of the measure used in the present study.

It may be useful for future research focusing on preparation to differentiate between self-focused acts of prevention, such as sandbagging one's own property, and other-focused acts of prevention, such as sandbagging dikes along the shores of the community. It may be that differences in these actions are associated with different psychological outcomes. Furthermore, there may be a difference in the psychological functioning of individuals who engage in these different behaviors prior to the disaster. It might also be important to differentiate between "wasted" resources and those which, ultimately, acted to preserve resources. For example, in the case of an individual whose home was flooded, spending money on insurance was different than spending money on sandbags, as buying insurance acted to recoup losses afterward but spending money on sandbags was unable to protect resources. The present study did not differentiate between such activities of preparation, and should be addressed in future research. In addition, it may be useful for future research to address less direct activities of preparation more common in women, such as tending to children. This activity could be considered preparation, in that it may have allowed men to participate in more direct, physical activities of flood preparation, such as sandbagging.

This study assessed psychological outcome of a generally non-life threatening natural disaster. Although the COR model does appear to be a promising area of research, it would be prudent to examine further the efficacy across other types of accidents or traumas. It may be that subjective value of resources, in other circumstances, is an important consideration. Furthermore, specific types of resources lost may vary

across different types of disasters. These methodological and theoretical issues should be addressed in future research in order to lend greater credibility to the results of the current study. Until then, resource loss remains a promising variable to consider in disaster research.

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