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Technological Disasters: An Investigation Of The Conservation Of Resources Theory On Depression

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TECHNOLOGICAL DISASTERS: AN INVESTIGATION OF THE CONSERVATION OF RESOURCES THEORY ON DEPRESSION

by

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ABSTRACT

Researchers studying the affects of resource loss following a technological disaster have exclusively investigated the acute period directly after the event occurred. This study applied Hobfoll's (1988, 1989) Conservation of Resources model in order to examine the long term effects of resource loss on depression in Cordova, Alaska a decade after the Exxon Valdez Oil spill. Results suggest that resource loss was a more prominent predictor for depression than demographics, involvement in the on-going litigation, or commercial fishing jobs. The research concludes that certain aspects of resource loss are critical in the development of depression after a technological disaster, and in understanding how to address depression in the community.

This thesis is dedicated to the memory of Dr. Brent K. Marshall, whose outstanding mentorship and dedication in working with me was truly a blessing in the continuation of my education. A fantastic educator and friend, he will be sorely missed, but never forgotten.

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LIST OF ACRONYMS/ABBREVIATIONS

COR	Conservation of Resources theory
EVOS	Exxon Valdez Oil Spill
NGO	Non-governmental Organization
PTSD	Post-Traumatic Stress Disorder
SCLR-90	Symptom Checklist 90 - Revised
UNEP	United Nations Environment Programme

CHAPTER ONE: INTRODUCTION

Disasters play a major role in the lives of many people. In the United States alone, nearly 2 million people will be affected each year by a natural disaster (1989). Hundreds of billions of dollars in economic damage resulting from injury and property occurs annually, with a substantial risk to exposure to disaster over a person's lifetime (Norris, 1992; Solomon, 1989). Research into the psychological effects of disasters continually illustrates how serious, and often long-term, the stress responses tend to be (Rubonis & Bickman, 1991). Depression, anxiety, and post-traumatic stress disorder (PTSD) emerge as the most common of these psychological responses (Green & Lindy, 1994). Hobfoll's (1988, 1989) Conservation of Resources (COR) model finds people maintain an innate and learned desire to conserve the quality and quantity of their resources, and to limit any action that may jeopardize the maintenance of these resources. The COR model presents one approach for exploring a plethora of disruptive events.

A substantial amount of COR research has focused on response to natural disasters (Benight et al., 1999; Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994; Freedy, Shaw, Jarrel, & Master, 1992; Kaiser, Sattler, Bellack, & Dersin, 1996; Sattler et al., 2002), but few researchers (Arata, Picou, Johnson, & McNally, 2000) have investigated the importance of resource loss on depression after a technological disaster. Technological disasters represent some of the most disruptive events of the late 20th and early 21st Centuries.

Narrowing the focus to long-term community damage and depression, the damage caused by technological disasters is particularly substantial (Norris, 2005). Empirical application of the COR model to technological disasters as disruptive events, and the subsequent impact on

resource loss and recovery, is notably lacking despite the ongoing and future salience of technological disasters. The purpose of this research is to apply the COR model towards an understanding of the long-term impacts of the Exxon Valdez Oil Spill (EVOS). Survey data collected in 2000 will be utilized in order to take a simple count of effects of resource loss on depression of the people living in Cordova, Alaska.

CHAPTER TWO: LITERATURE REVIEW

Disasters

A disaster is an enormous event that causes a breakdown between humans and their environment on a scale that generally requires extraordinary efforts to allow the afflicted communities to cope, and often requires outside aide or help (Lechat, 1990; Noji, 2005; Spiegel, 2005). The Asian Disaster Reduction Center (2002) describes disasters as events that seriously disrupt the functioning of society, causing widespread human, material, or environmental losses where the affected community is unable to cope on its own resources alone. Split into two basic categories, natural disasters are the result of natural phenomena such as volcanic eruptions, hurricanes, tornadoes, and tsunamis over which man has no control. They are often termed as "Acts of God." Technological disasters are those disasters that result from human decisions (Shaluf, 2007).

Perrow (1999) suggests that current technological installations are so complex and so closely linked together that accidents are inevitable and inherit in their design. Shrivasta (1994) furthers this line of thinking by pointing out how accidents in complex technical systems are caused by multiple failures in design, equipment, supplies, and procedure. Many times a failure in one part of the system starts a chain-reaction of failures along the rest of the system due to the high complexity and level of interaction among all parts. This means operators are often unable to stop or control the damage once the accident has been set in motion (Shaluf, 2007). Turner and Pidgeon (1997) classify technological man-made disasters as caused by (1) warfare or (2) vehicular (trains, planes, ships, cars), structure collapse, explosions, fire, biological, chemical, or

pollution accidents. These events tend to occur in at least four identifiable organizational situations: plant and factory failures, transport failures, stadium or other public place failures, and production failures (Richardson, 1994b).

The International Federation of Red Cross and Red Crescent Societies (2008) highlighted that these man-made disasters refer to non-natural disastrous occurrences that can be sudden and long-term. Sturgeon (1993) states that, "the common theme of disasters is that they are so catastrophic and overwhelming that they go beyond anything that individuals involved with normally have to cope with" (p. 421). The most damaging effects of disasters can be psychological scars present through trauma and most evident in a diminished feeling of safety and impaired social relations (McFarlane, 1995).

Mental Health states are effected by disasters often times by prior relationship strains and situations such as unemployment, which can compound disaster related stress and depression (McCubbin & Patterson, 1983; Myers, 1989). Where relationships breakdown, or a "fit" is missing for someone in a group or family and compounded by poor community support, a person is likely to feel distressed, anxious, and frustrated (R. Cohen, 1992). Poor people are often affected very disproportionately by disasters, meaning post-disaster response is often not enough, and their displacement or job loss can cause feelings of anxiety, stress, isolation, disruption, depression, and powerlessness (Tierney, 1989).

Natural versus Technological Disasters

Technological disasters tend to cause a greater feeling of social disruption and distress than natural disasters. Baum and Fleming (1993) suggests this is because man causes technological disasters, rather than nature, and may cause more severe or longer-lasting mental and emotional problems. Because there is someone to identify and place blame on, technological disasters represent a point of anger; where as a natural disasters cannot be blamed on anyone in particular. Federal and city officials may be blamed for mishandling a natural disaster, but they cannot be blamed for the event. Additionally, natural disasters tend to do their worst, and then move on. The immediate danger is over and reconstruction and recovery may begin, although exceptions are noted for events such as draught and famine.

More recent studies indicated that classifying disasters into "natural" and "technological" are less useful in understanding how people respond to a disaster than considering how someone makes sense of an event. Clarke and Short (1993) believe the key to understanding how individuals respond to disasters lie in the meaning they attribute to the event, regardless of its source. Through social interaction, individuals affected by disaster arrive at culturally informed definitions of the event that influence how they perceive and respond to the disaster (Douglas & Wildavsky, 1982; Kirby, 1990).

Even so, research shows that responses to natural disasters range from shock, anxiety, and sleep anxiety to impaired personal relationships, depression, and suicide (Crabbs & Heffron, 1981; Hartsough, 1982; Krug et al., 1998; Rubonis & Bickman, 1991). Rubonis and Bickman (1991) investigated a number of natural disasters. Overall, disaster exposure was accompanied by an average increase of 17% in impairments such as depression, anxiety, stress, phobia,

somatization, alcohol and drug use, and distress. High death rate associated with natural disaster tended to produce the majority of these impairments, but in most situations the distress dissipated over time, suggesting the needs of the victims may be acute rather than chronic.

Neumayer and Pluemper (2007) suggest that natural disasters, despite the random nature of the event, do not affect people equally. They suggest that a vulnerability approach suggests that inequalities in exposure and sensitivity to risk combine with inequalities in access to resources, capabilities, and opportunities systematically disadvantage certain groups of people. Economists have shown how a country's low level of economic development, poor quality of their government institutions, and high degree of inequality increases the death toll from earthquakes as well as other types of disasters (Escalares, Anbarci, & Register, 2007). In addition, the poor are more likely to be adversely affected by natural disasters.

The poor are more likely to live in flood and storm prone areas, on unstable slopes prone to landslides, have less access to education and financial support to overcome adverse impacts, and are less likely to be able to afford adequate housing able to withstand natural disasters (Noji, 1997). There is some research that shows that a number of the poor affected by these disasters tend to be women, suggesting a gender bias. UNEP (2005) discusses a study in Japan illustrating that during the Kobe earthquake in 1995 1.5 times as many women died than men. In this case, many single elderly women were living in poor residential areas, which were more severely damaged and prone to fire. However, the gender gap in life expectancy after a natural disaster decreases with an increase in the size of the disaster, and in areas where women have a higher level of socioeconomic status. Neumayer and Plumper (2007) found that in areas where the socioeconomic status of women was low, women's life expectancy decreased drastically

suggesting a systemic nature to disaster effects where the poor are most likely to be seriously affected by natural disasters. Despite these issues, strides have been taken in the United States, and worldwide, to help minimize the effects of natural disasters.

Citizens become informed through disaster management plans on how to best implement measures to minimize damage, helping in recovery after the event. This is not to say natural disaster mitigation is without its problems. Administrative resources are often inadequate, the people in charge of implementing health and safety control actions are often hesitant to do so, and managing agencies often lack proper monitoring and surveillance resources (Kasperson & Pijawka, 1985). Regardless, increasing natural disaster awareness, and strengthening beliefs in the possibility of taking mitigation and preparedness measures is an initial stage in motivating community members for the development of appropriate preparedness behaviors (Mulilis, Duval, & Lippa, 1990).

The Board on Natural Disasters (1999) explains that the two basic approaches for reducing the impacts of natural disasters are mitigation and response. Mitigation includes all actions taken before, during, and after the occurrence that minimizes its effects. Response includes those actions that are taken immediately after the event to reduce suffering and hasten the recovery of the affected people and region. Crisis intervention has generally been viewed as the appropriate model for service delivery because most disaster victims only need short-term assistance, and do not develop long-term serious issues (Joyner & Swenson, 1993). Additionally simple booklets about hazards, workshops, seminars, and applied training courses in mitigation and preparedness have all been utilized in community training (Asgary & Willis, 1997). When individuals are persuaded that they are at risk of confronting natural disaster events that will

threaten their well being, they will engage in adaptive behaviors. In other words, if people feel their well being may be threatened, they are more likely to engage in mitigation and preparedness behaviors (Karanci & Aksit, 1998).

Communities can often achieve significant reductions in losses from natural disasters through the adoption of land-use plans that avoid hazards (NRC, 1999). For example, cities in flood prone areas who undertook a management plan reduced flood-plain development to less than 25% of what would have occurred without the local planning programs, yielding $11 million in reduced property damage per year, and an annual administrative cost of only $1.3 million (Burby, Bollens, Kaiser, Mullan, & Sheaffer, 1988). Despite this, some research has shown that experience with natural disasters has not been found to be a decent predictor of preparedness behavior (Karanci & Rüstemli, 1995; Rincon, Linares, & Greenberg, 2001).

Research on preparedness behavior regarding natural disasters shows that age, income, education, locus of control, beliefs in control, perceived threat, and distress were all significant predictors of preparedness behaviors for hurricanes and earthquakes (Karanci & Rüstemli, 1995; Kasapoglu, Ecevit, & Ecevit, 2004; Rincon et al., 2001). Anxiety about future earthquakes and perceived control were significant predictors of preparedness among the survivors of the Erzican, Turkey earthquake. Education, social security, and employment were significant predictors for the preparedness for future earthquakes among survivors of the Marmara earthquake in 1999 (Karanci & Rüstemli, 1995; Kasapoglu et al., 2004).

On the national scale, serious natural disasters often invoke a heartfelt and generous response from the news media, multiple governments, the United Nations, non-governmental organizations (NGOs), and from both private and public sectors (Spiegel, 2005). Conceptualized

as altruistic communities (Barton, 1969), post-disaster utopias, and social utopias (Fritz, 1961), therapeutic communities provide natural disaster victims with physical and emotional support creating solidarity and unity necessary for the rebuilding process (Cuthbertson & Nigg, 1987). Spiegel (2005) suggests these communities exist because natural disaster response is generally easier and less politically risky than other types of disaster.

For example, the tsunami of 2004 wrecked havoc around the Indian Ocean. The large media coverage garnered immediate sympathy and within 12 days 19 governments came together at an international aid conference and pledged over $4 billion (Corder, 2005). The Bam Earthquake of 2003 received $1.5 billion, Honduras $3 billion after Hurricane Mitch in 1999 and $900 million to Bangladesh after the floods in 1998. One of the reasons this money rapidly appears is because natural disasters can occur quickly any where in the world, and there is not a well defined party who can be identified as having caused the problem. In other words, natural disasters cannot be linked to people (Spiegel, 2005). Because of this, natural disaster response tends to be quicker and less adversarial.

In addition, traditional institutions, such as religion, provide coping services following natural disasters. Ministers often play an important role in offering emotional support to individuals after a tragedy. People who are confronted with losses frequently turn to clergy for guidance and counseling. Particularly in rural areas where mental health resources may be scarce, ministers serve a particularly vital role in helping those people who have traumatic experiences (Bradfield, Ectherling, & Wylie, 1989). Bradfield and associates (1989) illustrated the relief work ministers provided after the destructive flooding in West Virginia in 1985. All the ministers they surveyed participated in flood relief work. A majority of whom provided

food, clothing, and shelter while others were involved in rescuing people at risk, offering emotional support, and generating and dispensing donations. This kind of community response combines with emergency services to help reduce both physical and emotional damage and begin the rebuilding process after a natural disaster.

Natural disaster response generally maintains a set of emergency services aimed at putting people back on their feet through both relief and rehabilitation services. The relief aid aims to alleviate the victims from distress and re-establish supplies for basic needs, while rehabilitation works to provisionally re-establish both social flow and functioning networks (Albala-Bertrand, 2000). Communities impacted by natural disasters also benefit from anticipatory response, or measures that seek to prevent or soften future disasters and its effects (Smith, 1992). These communities promote insurance industries and introduce mortgage and taxation systems aimed at encouraging behavior that is safe, helping spread out risk distribution, and therefore reducing the effects of a natural disaster (Kasperson & Pijawka, 1985).

The feelings of distress and depression are replaced by feelings of fellowship, and the feelings of loss are replaced by a sense of getting back to normalcy. Barton (1969) furthered this research by presenting a set of interrelated variables he believed accounted for the largest portion of the variance dealing with conditions where therapeutic communities emerged. When an individual's or family's typical coping resources are inadequate for the resulting stress, those resources can be supplemented or enhanced by social support (Hobfoll, 1988). Social support serves a positive function in stressful situations (Cook & Bickman, 1990). It functions through a set of exchanges that provide individuals with material and physical assistance, social contact, emotional sharing, and the sense that one is the object of concern by others (Pilisuk & Parks,

1981). After a natural disaster supportive family units and strong kin networks can protect individuals emotionally and materially from many of the negative consequences associated with disasters (E.L. Querentelli, 1998). Although prior family strains and preexisting stressors can compound disaster related emotions (McCubbin & Patterson, 1983; Myers, 1989). However, because natural disasters follow an indiscriminate path and cannot be prevented, community members experiencing loss are less likely to feel intentionally or unjustly victimized.

Barton (1969) illustrates how important these communities are because the matter of role definition, role competence, and possible role conflict are major factors in determining how communities react to disaster. In explaining and predicting the rise of therapeutic communities a total of 71 different propositions were advanced, 39 refer to individual relationships, 23 to contextual relationships, and 9 to collective relationships. In addition, people are more likely to believe the community as a whole has suffered, and material destruction is more evenly spread out across a wide variety of groups and socioeconomic classes (Cutherbertson & Nigg, 1987). Early research on natural disaster research found emergency response efforts are designed to provide social, financial, and economic support in order to generate a "therapeutic response" (Fritz, 1961).

People are likely to find others who have been hit as hard or worse by the natural disaster, and are more likely to feel the community as a whole has suffered, creating what Fritz (1961) called a "community of sufferers." The victims set aside their differences, and form a more cohesive group feeling they have all suffered and are in it together. Those members who avoid the disaster or suffer little damage may feel fortunate in comparison to the other more severely victimized individuals. They may also develop a since of guilt for having survived unscathed.

Erikson (1976) calls this survival guilt, and it helps create an optimum context for non-victimized community members to develop feelings of sympathy and concern for their less fortunate neighbors. In addition, the fact that the people did not choose to live in the path of destruction tends to encourage sympathetic responses from people not as affected by the natural disaster (Cutherbertson & Nigg, 1987).

Quarentelli and Dynes (1977) discuss how a high priority of actions develops, consisting of widespread agreement on the order things should be done in, and what things should be done about the disaster. Dynes and Tierney (1994) state that restoration and maintenance of essential community services, public order, and public morale are the most significantly addressed community problems immediately following the disaster.

Behavior begins to be guided by emergent norms as traditional, and routine, ways of handling the situation are unavailable or inoperable (Turner & Pidgeon, 1997). The beneficial results of acting together help foster a general sense of community identification and unity. Members provide each other with the emotional sustenance in order to overcome the disaster trauma, what they call community residents "enacting solidarity."

Natural disasters follow a consistent sequence of events, and impact a community's social structure at identifiable levels (Gill & Picou, 1998). Drabek (1986) identifies 8 disaster phases (planning, warning, evacuation, emergency, restoration, reconstruction, hazard perceptions, and adjustments) and six levels of social structure (group, individual, community, society, organizational, and international) affected by disasters. In contrast, technological disasters are an amalgamation of human error and mechanical malfunction, and include things such as chemical explosions, oil leaks, fires, and exposure to radioactive materials.

Technological disasters occur when breakdowns in technological and bureaucratic organization systems lead to destruction or contamination of the natural and built environments (Gill and Picou, 1998).

Trauma resulting from technological disasters creates collective stress, including: (1) "reality disjuncture" a form of cultural change where no shared group assumptions exist, and (2) structural change, which disrupts community routines and social networks (Kroll-Smith & Couch, 1990). These sources of stress generate additional stressors because of the accompanying uncertainty, loss of control, alienation, and issues surrounding threat belief systems. Elevated levels of uncertainty requires the victims to construct their own version of reality, trauma and stress related to technological disasters cannot be ameliorated with only technical support or human assistance (Ritchie & Gill, 2007).

Richardson (1994b) explains how technological events consist of three stages: pre-disaster, disaster, and post-disaster. The most important stage during technological disasters is the first the pre-disaster stage described by Turner and Pedgeon (1997) as a precondition incubation period, this period is the "accumulation of an unnoticed set of events, which are at odds with accepted beliefs about hazards and the norms for their avoidance." Hood and Jackson (1992) believed the incubation period seems to be a key element in organizing the disaster for three reasons: (1) there is enough time for crucial signals to be misread, evidence ignored, or misinterpreted, (2) there is enough time for organizations to work themselves into an incompetence trap where they learn to do the wrong thing, and (3) enough time for minor events to interact and accumulate to produce major system failure.

Grabowski and Roberts (1997) point out that longer incubation periods can mask signals of danger important in risk analysis in large-scale systems. These periods mean that latent failures can exist unnoticed for prolonged periods of time, reducing the effective windows of opportunity where intervention and risk mitigation measures may be taken. In between the pre-disaster and disaster stage there is a triggering event. Richardson (1994a) explains that the triggering event is assumed to be the point after which disaster is unavoidable. This means that in many cases the predictability of technological disasters is extremely low.

Predictability has been identified as an important factor in determining the response to adverse events (Glass & Singer, 1972). People who are unable to predict the event of the stressor are more likely to exhibit signs of greater stress levels, including higher levels of stress hormones, compared to persons who perceive greater predictability (Evans, Wener, & Philips, 2002). While improved meteorological and geologic technology allows experts to better inform, and warn, the population of impeding emergencies the same cannot be said of technological disasters. Technological and human-made disasters continue to be difficult to predict, and therefore a large amount of effort is put forth towards prevention and safety checks (Baum & Fleming, 1993; Lange, Fleming, & Toussaint, 2004). This means perceptions of low predictability and foresee ability are likely to lead to coping reactions that are more passive and characteristic of helplessness as attempts to change the situation are believed to be futile (Folkman & Lazarus, 1988; Wortman & Brehm, 1975).

The same is true of agencies. If people believe the agency should have been able to predict or foresee an accident, failure to do so will most likely result in mistrust and disappointment in the organization (Kasperson, Golding, & Tuler, 1992). If experts are believed

to have an ability to foresee and manage risks, then they are more likely to be judged as responsible when something goes wrong (Brown, 2000). In other words, perceptions of accident foresee ability of technological disaster events are likely to lead to anger, annoyance, and hostility toward the individuals or organizations assumed responsible for the failure (Weiner, 1993, 1995).

Often, these disasters exact enormous long-term financial issues due to their large toll on biological resources and the other components of the natural environment (M. J. Cohen, 1997). Early technological disaster research points to the presence of considerable conflict in the community (K. Erikson, 1976; Levine, 1982; Nigg & Cutherbertson, 1982). This emergence of conflict depicts the absence of the therapeutic communities found after natural disasters. People understand and know the general effects of a natural disaster. However, technological disasters are often ambiguous and confusing due to little being known by the general populace about the exact repercussions on their community and environment. This ambiguity is a major contributing factor for the emergence of conflict-related communities in the wake of a technological disaster (Cutherbertson & Nigg, 1987).

In the aftermath of catastrophic technology-based disasters, the emergence of a corrosive community or a community with a consistent pattern of chronic impacts to individuals occurs (Baum & Fleming, 1993; Freudenburg & Jones, 1991; J. S. Picou, Marshall, & Gill, 2004). These disasters are prone to conflict because they frequently release contaminants into the environment from an identifiable, human created, source. This creates a feeling of risk and insecurity in the community about personal and ecological exposure to contamination (Erikson, 1994; Hallman, Short, & Rice, 1999; Vyner, 1988).

Picou, Marshall, and Gill (2004) identified three significant factors for understanding why corrosive communities emerge and persist:(1) the mental and physical health of victims (Arata et al., 2000; Baum & Fleming, 1993; Freudenburg & Jones, 1991; J. S. Picou & Gill, 2000); (2) feelings of "recreancy," or the perceptions of failure on the part of government or organizations (Couch, 1996; Freudenburg, 1993, 2000; J. S. Picou et al., 2004); and (3) the emergence of protracted litigation (Gill & Picou, 1998; Marshall, Picou, & Schlichtmann, 2004; J. S. Picou & Rosebrook, 1993). In the case of technological disasters, recreancy often plays a major role in the prolonged feelings of stress communities feel after the technological disaster has occurred.

Freudenburg (1993, 2000) describes recreancy as a form of institutional malfeasance where an expert or organization fails to carry out an expected responsibility. This addresses the loss of trust in institutions and organizations, "the failure of experts or special organizations to execute properly responsibilities to the broader collective with which they have been implicitly or explicitly entrusted" (2000, p.116). Technological disasters create a rise in loss of trust in the system, particularly among victims, which is a contributing factor on the disruption in ontological security (Kroll-Smith & Couch, 1990; Ritchie & Gill, 2007). As a social environment, it tends to cultivate social responses that draw down reserves of social capital by evoking feelings of a loss in trust, setting the stage for emergence of individual and collective trauma, lifestyle and lifescape change, a corrosive community, and secondary trauma (Ritchie and Gill, 2007).

A number of empirical studies focusing on the social and psychological impacts of technological disasters have established that technological disasters produce higher levels of

chronic and long-term stress than natural disasters (Baum & Fleming, 1993; Gill & Picou, 1998; Picou & Gill, 1996; J. S. Picou & Gill, 2000). Erikson (1976) describes how collective trauma following technological disasters results in a change in social dynamics and the way people and groups relate. A community's ability to mobilize various forms of resources, such as money or expertise, is critical for collective action and community-level social infrastructure. Edelstein (1988) shows how lifestyle change is a disruption in routines and patterns of everyday life.

This change is represented as a coping mechanism that involves the altering of routines or activities in order to accommodate or respond to stressful events. Lifescape change is the psychological response to stress involving the disruption of fundamental assumptions on how the world works. Changes in lifescape result in feelings of isolation, abandonment, distrust in others, health concerns, loss of control, and distrust in the environment. This change may accompany both natural and technological disaster, but is more likely to appear in technological disasters and maintain enduring qualities. In the aftermath of a technological disaster, stress, lifestyle change, and lifescape change not only occur at the individual level, but they also emerge as a form of collective response (Ritchie & Gill, 2007).

Technological disasters tend to lack shared assumptions or consensus in the community. This lack of consensus is associated with uncertainty or "ambiguity of harm" surrounding technological disasters, including the extent and consequences of the contamination typically associated with them (Cutherbertson & Nigg, 1987; Davidson & Baum, 1991; Edelstein & Wandersman, 1987; Freudenburg, 1997; Freudenburg & Jones, 1991). In addition, chronic feelings of demoralization, a loss in the ability to cope, anger, depression, fear, frustration, paranoia, alienation, distrust, low self-esteem, and a diminished self-worth have all been

associated with exposure to technological disasters (Arata et al., 2000; Baum & Fleming, 1993; Gill & Picou, 1998; Kroll-Smith & Couch, 1990; Picou & Gill, 1996; Ritchie & Gill, 2007). This weakened state of ontological security also affects the ability of communities to effectively respond to external threats. People outside the community affected by a technological disaster are also not in a position to fully understand the trauma and stress created by the event, rendering them less able to offer support (Edelstein, 1988; Edelstein & Wandersman, 1987; Ritchie & Gill, 2007).

Kroll-Smith and Couch (1990) discuss the way a mine fire turned into a "chronic technical disaster." In this case, the existential community, those communities governed by criteria of common belonging rather than rational goals and functional roles, failed creating an intramural conflict separating neighbor from neighbor. They continue by illustrating how religious support systems, generally present after natural disasters, do not appear in this case due to the "man-made" nature of the event. In effect, because it was not an "act of god," it removed one of the major support systems for communities after a disaster. The chronic nature of these disasters are distinguished from natural disasters in that collective response is compromised because the event may not be isolated in any one place, and may persist over a lengthy amount of time. Emergency social systems typically wait until a disaster is under control, but in this case years may go by before it happens. In other words, the ambiguous nature of technological disasters results in conflict over who is to blame, and in many cases "expert" intervention fails to address the problem adequately (Couch & Kroll-Smith, 1985). Despite this, there are some cases where consensual community response appeared in order to address a technological disaster.

Gunter, Aronoff, and Joel (1999) describe consensual community response as occurrences where there is no community mobilization to challenge what is perceived as negligent government officials. The approach of Couch and Kroll-Smith (1985), in the view of Gunter and colleagues, has been a tendency to select highly contentious cases in which citizens mobilize against recalcitrant government officials. In this case, Gunter and her colleagues' investigated St. Louis and the City of Ionia. They found a relatively composed citizenry confronting an alarmed and proactive government. However, there were not any preexisting identifications of unusual health problems among residents. In neither of these two communities did area contamination problems result in the kinds of intrusive impacts on everyday life as have been documented in Ledger, New Jersey (Edelstein, 1988), Centralia, Pennsylvania (Kroll-Smith & Couch, 1990), or East Swallow, Colorado (Erikson, 1994).

Zavestoski and colleagues'(2002) examination of the community response in the case of the Woonasquatucket River's contamination illustrated how consensual community response can occur even when the public has not been meaningfully involved in the decision-making process. In this case, response was driven by particular community characteristics and the manner in which officials handled the case. A shared understanding of the regions industrial legacy helped eliminate Edelstein's (1988) pre-disaster stage, in which unsuspecting citizens who believe toxic disaster will never happen to them are alarmed at finding a toxic disaster brewing in their community. This suggests that in cases of technological disaster, community alertness toward their surroundings may decrease the odds of a corrosive community developing due to their awareness of the risk. In cases where the source of pollution is unidentifiable, anger and activism may be directed at the government, but such action may be preventable if officials are

portrayed as completely forthcoming with all information, and placing themselves in the community as "experts." However, this means cases where there is still some amount of ambiguity remaining about the effects of the disaster may cause problems.

Ambiguity regarding the nature and consequences of disaster agents was a major force in contributing to the emergence of conflict in Cuthbertson and Nigg's (1987) study on events involving pesticides and asbestos. Individuals involved attempted to clarify two types of ambiguity: the disaster agent and the possibility of health concerns and the extent of the problem. Both issues became difficult because of the lack of a clear definition on the effects of the technological agents, and in some cases were completely unavailable at the time because of the dormant period involved in showing illness. They discuss how asbestos disease has a latency period of 20 to 30 years, meaning that no physical symptoms were present to provide evidence of suffering or facilitate altruistic concern.

They go on to discuss how the lack of visible destruction, as associated with natural disasters, is often lacking in cases of a hazardous chemical or substance for prolonged periods of time. They found that even when physical symptoms were found sympathy and concern was lacking. In fact, the differing definitions of the consequences found in the pesticide case made many view the symptoms as hysterical reactions or allergies, rather than true health effects from exposure. This is not to mention situations where community involvement is prolonged from involvement in the clean-up, reconstruction, or continued litigation essentially forces the community to continue to deal with the effects of technological disasters.

Often, protracted litigation occurs as a form of a chronic and persistent stress inducer. Litigation exposes experts and organizations as irresponsible, incompetent, and untrustworthy,

contributing to chronic disaster impacts through loss of trust in support systems (Freudenburg, 2000). Similarly, Picou, Marshall, and Gill (2004) find that litigation is a significant cause of stress after a technological disaster. Even though their study examined the *Exxon Valdez* oil spill, an event that immediately changed the environment in Alaska; they still found one of the most important structural characteristics over time was being a plaintiff in the civil litigation. The protracted litigation becomes a form of secondary stress, independent of the event-related stress, impeding timely recovery for the victims.

Marshall, Picou, and Schlichtmann (2004) illustrate how the legally based delay tactics employed by Exxon's lawyers in the following years after the Exxon Valdez Oil Spill (1989) caused litigants to have higher levels of intrusive stress and depression over those who were not involved in the litigation. Eleven years after the disaster, being a litigant was the strongest predictor of psychological distress. In other words, because technological disasters have a person to blame, litigation may become a source of continuing agony for the community involved. In addition, these disasters typically include some form of resource loss, be it social, cultural, physical, or emotional. As such, the application of the COR model to examine the relationship between resource loss and depression is important when investigating community response to technological disasters.

Conservation of Resources Model

The Conservation of Resources (COR) model finds that people maintain an innate and learned desire to conserve the quality and quantity of their resources, and work to limit actions that may jeopardize the maintenance of these resources (Hobfoll, 1988, 1989). In other words,

individuals strive to obtain, retain, and protect that which they value. Hobfoll breaks these valuables down into four categories of resources: (1) objects (e.g. food, car, shelter), (2) conditions (e.g. job, tenure, marriage), (3) personal characteristics (e.g. social competence, self-esteem, sense of mastery), and (4) energies (e.g. money, credit, insurance). Objects acquire value through scarcity and demand, and are resources to the extent they meet survival needs. Conditions ensure stability and aid in obtaining other valued resources such as love, status, and privilege. Personal characteristics are prized aspects of the self, and provide access to other valued states such as social aplomb or job skills. Energies enhance access to objects, conditions, or personal resources such as using money to obtain objects, enhance conditions, or to increase personal resources (Hobfoll, 1988, 1989; Hobfoll & Lilly, 1993).

Resources including self-esteem, available social support, a feeling of trust, and a sense of control are highly valued. Stress occurs when the environment threatens these resources (for a comprehensive list of resources see Hobfoll and Lilly, 1993; Hobfoll, 2001). Hobfoll further posits psychological stress occurs in any of the following three circumstances: (1) when individuals' resources are threatened with loss, (2) when individuals' resources are lost, and (3) when individuals fail to gain resources following the investment of other resources. Disasters tend to create an immediate or rapid loss of resources. Hobfoll and Lilly (1993) predict that when resources necessary for survival are not provided, stress will ensue. Psychosocial consequences occur due to the extent to which social structures do not provide or block access to these resources. Rapid resource loss frequently creates acute stressful conditions (Hobfoll & Lilly, 1993).

According to the COR model, resource loss is the primary cause of stress as it is disproportionately weighted in the human experience. Transitions and change are stressful to the extent they encompass undesirable loss. Hobfoll (2001) discusses how research indicates across cultures the largest stressful events in life are consistently major loss events (e.g. loss of a loved one, loss in health, loss of gainful employment). In order to provide a buffer to such events, people must invest resources so that following the threat or potential loss of resources, or the perception of the actual loss of resources, they may limit the loss and endeavor to maximize the gain of resources. In this way the COR model develops principles and corollaries expanding upon the central idea of resource loss causing stress.

The first principle is referred to as the primacy of resource loss, or the idea that resource loss is disproportionately more salient than resource gain. When given equal amounts of loss and gain, loss will have the greater impact. The second principle, termed resource investment, states that people must invest resources in order to protect against resource loss, recover from loss, and gain resources. Additionally, two corollaries support the two main principles: (1) people with greater resources are less vulnerable to resource loss and more capable of orchestrating gain, and (2) people with fewer resources are more vulnerable to resource loss and therefore less capable of gain, meaning people who lack resources must contend with how the initial loss begets future loss (Hobfoll, 1988, 1989, 2001; Hobfoll & Lilly, 1993).

Application of Conservation of Resources

Job Burnout

Much of the research on COR modeling focuses on job burnout, and its relationship to resource loss. The primacy of resource loss has been tested in a number of job burnout studies which focus primarily on condition and personal characteristic resource loss. Job related studies using COR posit that a lack of resource gain, or exposure to chronic loss following a major investment of time and energy, will produce a gradual increase in distress (Hobfoll, 2001). Job burnout is defined as a response syndrome where emotional exhaustion, depersonalization, and a reduced feeling of personal accomplishment occur (Cordes & Dougherty, 1993; Grandey & Cropanzano, 1998). Grandy and Cropanzano (1998) studied the effects of role stress and work-family conflict on burnout using a time-lagged survey assessing the relationships of work and family stressors on a population of university professors. They found that over time, as chronic work and family stressors drained resources, the participants experienced life distress, a lack of physical health, tension, depression, and family and job dissatisfaction. As predicted by the COR model, the participants then attempted to minimize the effects of the resource loss by intending to leave their jobs.

Brotheridge and Lee (2002) examined why emotional labor may lead to worker burnout. Workers presented with emotional demands such as the frequency, intensity, and varieties of the emotions they must display were hypothesized to use up emotional resources during work. They found workers were investing their personal and social resources in order to help themselves cope with the service encounters with customers. Extreme effort was needed in order to meet

role demands and, as a result, there is a large drain on a worker's emotional resources. Further, the findings indicate that the loss or potential loss of resources resulted in a much greater impact on psychological distress than resource gain.

Similarly, Neveu (2007) tested the idea that resource depletion is important for understanding job burnout among prison guards in the French correctional system. Anonymous surveys were administered to 1240 prison guards in order to test the effects of resource depletion on a number of different valued resources. He found that the role of depleted resources such as co-worker support, skill utilization, participation (condition resources), and professional worth (personal resources) caused an increase in emotional exhaustion and depersonalization syndromes.

Lee and Ashforth's (1996) meta-analysis of the job burnout studies found emotional exhaustion to be more strongly correlated to burnout than either depersonalization or feelings of accomplishment. Examining 61 articles using the Maslach Burnout Inventory, their results showed how emotional exhaustion was a much stronger predictor of job burnout, and illustrated how it had a greater effect than correlates which resulted in a lowering of burnout. Out of eight resource loss correlates, five were found to be strongly related to greater burnout with only one indicator of resource gain being related to lower burnout rates.

Janssen, Schaufeli, and Houkes (1999) attempted to build on earlier research by testing work related demands, resources, and self-esteem levels in 156 Dutch Nurses. Their findings showed emotional exhaustion is strongly associated with the demand of "work overload." Resources including support from supervisors and coworkers were primarily related to feelings of emotional exhaustion, in that the more support one perceived the less likely they were to feel

exhausted. However, the gain relationship was considerably weaker than the loss relationship, meaning the loss of support had a greater effect than any perceived gain in support. Wright and Cropanzano (1998) continued this line of research when they investigated 52 social welfare workers during a one-year longitudinal study examining the relationship of emotional exhaustion to job satisfaction. Multiple regression analysis demonstrated that emotional exhaustion predicted both turnover and job performance. Their findings show that emotional exhaustion occurs when an individual feels they do not have an adequate supply of emotional resources to handle interpersonal stressors.

The COR model suggests these kinds of loss spirals could be prevented if even short periods of gain are injected at some point. Westman and Eden (1997) tested the effects of vacations on 76 clerks from an electronics firm in Israel who completed surveys of job stress and burnout twice before a vacation, once during their vacation, and twice after. They found that perceived job stress and burnout covaried, with both declining during vacation and rising slowly after vacation. Hobfoll and Shirom (1993) explain how in order to prevent resource loss other resources must be invested. The vacation interrupts emotional stress from job related resource loss, effectively halting a "resource loss spiral," and promoting a short gain as a means of preventing stress. These studies are useful because they explore the importance of personal characteristic and condition resource loss in creating depression. Perhaps job burnout studies are not nearly as widespread or catastrophic an experience as a disaster, but never the less job burnout makes up a significant portion of COR research in explaining emotional distress. Further, their investigation of job related stressors may give some insight into the causes of depression when work-related resources are rapidly depleted after a disaster.

War and Terrorism

While there are differences between traumatic events such as natural disasters, technological disasters, and terrorism, similarities can be drawn because rapid resource loss may occur in all scenarios. Benotsch and colleagues' (2000), studying people returning from the Gulf War at two different time periods, found that as resources depleted over time PTSD symptoms increased. Galea et al. (2002) discovered individuals who lost friends, family, or jobs due to the World Trade Center Attacks on September 11th were particularly affected. Dekel and Hobfoll (2007) examined the stress levels of 102 Holocaust survivors in Israel during recent periods of continuous exposure to terror and threat of missile attack. Exploring the contribution of losses suffered from the Holocaust, and the current loss due to terrorism, they found that Holocaust experience and current stressful life events were insignificant after controlling for resource loss. The largest variance for describing the strongest predictors of PTSD and general psychological distress was a loss of available social support, self-esteem, feelings of trust, and a sense of control.

Hobfoll, Canetti-Nisim, and Johnson (2006) conducted a study of terrorism through phone interviews with 905 Jewish and Palestinian adult citizens of Israel. Respondents' exposure to terrorism, and the subsequent loss of precious resources, including family and friends, resulted in the loss of psychosocial resources. This in turn was strongly related to symptoms of depression and PTSD for both Jews and Palestinians. In support of the COR model, people with more resources were generally more resistant to the effects of resource loss,

and people with greater sustained social support were less likely to display depressive and PTSD symptoms.

Natural Disasters and Technological Disasters

Months after the Sierra Madre earthquake rocked Los Angeles County, California in 1991 Freedy, et. al (1994) discovered resource loss to be a more important predictor of psychological distress than prior exposure to traumatic events, perceived life threat, and stressful life events. Resource loss explained 11% of the variance in psychological distress after accounting for life threat, previous trauma history, gender, age, ethnicity, and income. Undergraduate students in South Carolina surveyed after Hurricane Hugo illustrated the impact of resource loss on sense of coherence (Kaiser et al., 1996). The researchers found that resource loss greatly minimized the positive impact from a sense of coherence. Further, the findings support the idea that different types of psychological distress and depression may be related to resource loss. Freedy, Shaw, Jarrell, and Masters (1992) support these findings with evidence that after Hurricane Andrew, resource loss is the strongest predictor of psychological distress than a sense of coherence, coping style, or anxiety.

Hurricane Andrew was a Category 5 hurricane that touched land in the United States in August of 1992. It is the second most destructive hurricane in U.S. history, and caused an estimated 25 billion dollars in damages as it crashed through the Bahamas, southern Florida peninsula, and south-central Louisiana (Rapport, 1998). Carver (1993) examined the impact of Hurricane Andrew in South Florida, finding loss of resources was a greater predictor of psychological distress and PTSD than feelings of optimism or pessimism. Norris, Perilla, Riad, Kaniasty, and Lavizzo (1999) also focused on the impact of Hurricane Andrew, examining both

the initial and long-term responses to the disaster. Their findings illustrate how resource loss had a significant impact on the initial traumatic responses, but also on long-term, on-going resource loss.

Benight et al. (1999) surveyed 180 residents in southern Dade County in the initial months after Hurricane Andrew and 135 individuals in the second wave 8-12 months later. They found resource loss directly influenced how emotionally distraught someone was, how capable they felt towards restoring their life back to normal, and the extent of coping behaviors the person will enact. Further, the findings support that people will base coping responses largely on attempts to recover losses associated with trauma. Ironson et. al (1997) expanded on this research when they found resource loss to be the strongest predictor of general psychological distress and post-traumatic stress disorder following Hurricane Andrew. Likewise, they noted resource loss was the only predictor of immune issues where white blood cell counts were elevated, signifying an attack and decrease in natural killer cell cytoxicity.

Sattler, Preston, Kaiser, Olivera, Valdez, and Schueter (2002) examined college students in U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States following Hurricane Georges. Their findings show that personal characteristic resource loss and low social support created feelings of acute stress disorder (ASD). ASD was explained by different resource losses in each country. College students in Puerto Rico were most affected by energy and personal resource loss, U.S. Virgin Islands by object resource loss, the Dominican Republic by condition and basic object resource loss, and the United States by personal and condition resource loss.

Arata, Picou, Johnson, and McNally (2000) applied the COR model to commercial fishermen in Cordova, Alaska six years following the Exxon Valdez oil spill, expanding COR disaster research to include chronic disaster impacts. Resource loss helped account for the persistence of chronic psychological symptoms. Analysis showed a strong relationship between resource loss and symptoms of anxiety, depression, and PTSD. Condition resources ended up having the greatest effect through the deterioration of relationships with others and in physical health. To date, Arata et al. (2000) is the only application of the COR model to a technological disaster. As a chronic disaster, the question is whether or not resource loss has an impact on depression regarding the people living in resource-dependent communities eleven years after the spill.

The Exxon Valdez Oil Spill

The tanker *Exxon Valdez* released close to 11 million gallons of crude oil into the waters of south central Alaska's Prince William Sound on March 24, 1989, causing widespread ecological damage throughout the region. By June, the oil had contaminated an area greater than 1,900 kilometers along the Alaskan coastline becoming the largest spill in North American History (EVOS Trustee Council, 1999). Research suggests that because the disaster occurred during the season of greatest biological activity, it also had severe social and psychological impacts on the resource-dependent communities in Prince William Sound (Lord, 1997; Palinkas, Downs, & Peterson, 1992; Palinkas, Peterson, Russell, & Downs, 1993; J. S. Picou, Gill, Dyer, & Curry, 1992).

Monitoring of ecological damages over the years showed only six species (bald eagle, river otter, black oystercatcher, common murre, pink salmon, and sockeye salmon) had recovered to pre-spill levels by the year 2002, and the damage continues to plague many species of marine mammals, birds, and fish (EVOS TrusteeCouncil, 2002). Picou, Gill, and Cohen (1997) illustrated how the repeated failures of herring and salmon fisheries in Prince William Sound resulted in a decline in subsistence harvesting and produced a negative economic impact on both the local fishing communities and Alaska Native villages. Revenue losses for fishermen totaled over 155 million dollars during this period, and the eventual collapse of the commercial herring industry brought about more significant losses (M. J. Cohen, 1997; Schneider, 1993). These economic damages continue to remain unmitigated through litigation, as Exxon's legal appeals to a 5 billion dollar jury award to plaintiffs in 1994 is held up in review by the courts

(Arata et al., 2000; J. S. Picou et al., 2004). Eighteen years after the spill, the U.S. Supreme Court has agreed to hear the case.

The oil spill resulted in widespread economic damages and losses (M. J. Cohen, 1997). A number of studies documented how the effects of the loss from the spill quickly created mental health issues. Palinkas, Russell, Downs, and Peterson (1992) researched 11 communities in the region directly exposed to the spill and two control communities not directly exposed. Residents completed a survey with questions about their exposure experiences, cleanup work, contact with oil-spill related activities, and the effects of the spill on subsistence hunting, fishing, and gathering. Findings indicate that higher levels of depression and a decline in social relationships are related to an increase in exposure to the spill. Continued exposure and the subsequent resource loss caused by the spill produced symptoms of PTSD and generalized anxiety disorder (Arata et al., 2000; Palinkas et al., 1993).

CHAPTER THREE: RESEARCH METHODS

Hypotheses

Figure 1 is an illustration of how resource loss may influence psychological well-being. This model provides numerous hypotheses that include socio-demographics, the type of resource loss experienced, and the psychological well-being of the citizens of Cordova. A few of these hypotheses are given as an example listed below. For practical reasons Figure 1 is kept simple with arrows only flowing in one direction, but it stands to reason that psychological well-being is also affected due to demographics such as education. Because they are such a resource dependent area, Cordova community members feel the direct effects of EVOS through the devastation the event caused on the natural environment. Therefore, the people who's occupations are most directly linked to the natural resources provided by the area are more likely to feel the effects of the oil spill not only during the event, but also years later.

People who have achieved higher education are less likely to work in the jobs most affected by the oil spill, and are therefore less likely to be affected by the oil spill. At the same time, the litigation process is a continuing reminder of the event, and an ongoing legal dispute over the monetary compensation presents new problems for the parties involved. Additionally, those persons who are married may be more likely to withstand the effects of depression due to the opportunity for support and also another source of income. The reverse may be said of people who may be older in the community. It stands to reason that the standard psychological issues associated with being older will most likely have an effect, but in this case the resource loss may have a greater influence on older citizens due to the nature of the accident causing major damage to the local economy. The onset of retirement age and the influx of new younger

workers positioning themselves in the job market most likely caused problems for the older generations still in Cordova. Therefore people who experience the highest levels of resource loss are more likely to exhibit psychological well-being issues, and resource loss is the most likely source of depression over demographics.

Hypothesis 1: Women are more likely to experience depression than men.

Hypothesis 2: The more education a person has achieved, the less likely they will be affected by resource related depression, and the less likely they are to feel depressed.

Hypothesis 3: People who are married are more likely to withstand depression.

Hypothesis 4: Resource loss is more likely to explain depression than litigation or occupation.

(See Figure 1)

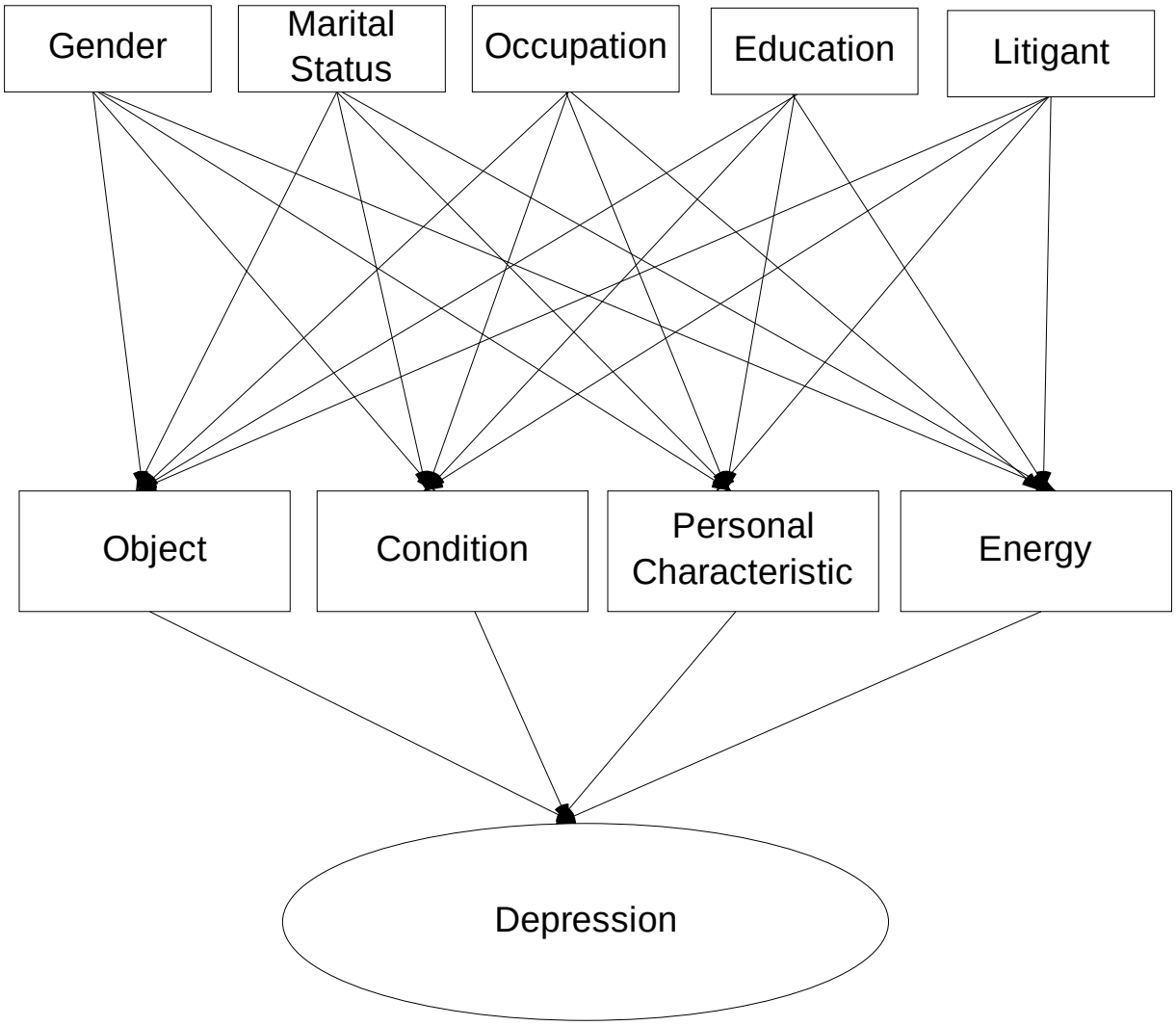

Figure 1 Path Diagram of Hypothesized Model

Methods

Data collection originated in Cordova, Alaska in 1989 and continued through until 2006. It was collected as part of a longitudinal study of social and economic impacts attributed to the *Exxon Valdez* oil spill (Arata et al., 2000; M. J. Cohen, 1997; Gill & Picou, 1998; Picou & Gill, 1996; J. S. Picou et al., 2004). The Cordova community was selected because it is an "impact community economically dependent on commercial fishing and commercial fishing jobs, characterized by culturally prescribed subsistence behaviors" (Picou, Marshall, and Gill 2004, p.1502). Cordova is a "renewable resource community" in that it maintains a resource-based economy and a blending of traditional and Alaska Native cultural values linking human behavior to the biophysical environment. Located in southeastern Prince William Sound, Cordova is geographically isolated with a population that varies from 3,500 residents in the summer fishing season to fewer than 2,000 during the winter (Arata et al., 2000; Gill & Picou, 1998; Picou & Gill, 1996; J. S. Picou et al., 2004). Using a random sample telephone interview system, the University of South Alabama Polling Center interviewed (N=227) residents living in Cordova, Alaska. In this case litigants were chosen from the community and were made up of commercial fishermen, seafood processors, landowners, native Alaskans and small businesses. Selection produced a straight split between people involved in the litigation process, and people who were uninvolved.

Indicators and Measures

Demographic Data: The variables used in this study were derived from data available from the 2000 household survey administered in Cordova as illustrated in Table 1. Social characteristics of respondents were determined by data on gender (1 = female; 0 = male), marital status (0 =

unmarried; 1 = married), occupation (1 = fishermen or fishing related; 0 = all other occupations), education (1 = some high school; 2 = high school diploma; 3 = some college; 4 =associate's degree; 5 = bachelor's degree; 6 = master's degree; 7 = doctoral degree; 8 = professional degree), being a litigant (1 = litigant; 0 = not a litigant), and age (see Table 1).

Table 1 Demographic Characteristics of Cordova Alaska (N=227)

Variable	Frequency	Percent
Gender		
Female	104	45.8
Male	123	54.2
Marital Status		
Married	108	47.6
Not Married	119	52.4
Occupation		
Fishing Related	35	15.4
Non-fishing Related	192	84.6
Education (n=196)		
Some High School	10	5.1
High School Diploma	37	18
Some College	73	37.2
Associate's Degree	14	7.1
Bachelor's Degree	40	20.4
Master's Degree	17	8.7
Doctoral Degree	3	1.5
Professional Degree (law, medicine)	2	1
Litigant (n= 220)		
Involved in litigation	110	50
Not involved in litigation	110	50

Psychological well-being: Depression questions were derived by Derogatis (1992), and were based off his Symptom Checklist 90 - Revised (SCLR-90; Derogatis, 1992). The SCL90-R is a 90-item self-report inventory designed to assess current psychological symptoms. Participants indicated on a scale from 0 to 4 the degree to which they experienced each symptom over the past two weeks (0 = not at all; 1 = a little bit; 2 = moderately; 3 = quite a bit; 4 = extremely). While a more complete measure was administered, this research is only concerned with the subscale focusing on depression which included three questions summed on how often the respondents felt blue, lonely, or how much time they spent worrying about things where a higher value indicated a higher depression score ($\alpha = .825$).

Resource loss measures gains or losses using a 5 point scale with the variables recoded into 3 categories (1 = Gain; 2 = No Change; 3 = Loss). Loss questions were then summed in order to establish the resource loss categories. Respondents were asked to think of gains as things that have gotten better and losses as things that have gotten worse. This should be interpreted in the higher the average scores the greater the resource loss. Objects acquire value through scarcity and demand. Questions focusing on Object resources asked respondents about commercial fishing, the natural resources of Prince William Sound, and the availability of subsistence resources. Condition resource questions investigated family stability, the relationship between married couples or partners, and the availability for time with loved ones. Personal characteristics are prized aspects of the self. These questions focused on motivation to get things done, life purpose, and feelings of success. In order to assess energy resources questions about

retirement security, medical insurance, savings or emergency money, and a feeling of adequate income were asked.

CHAPTER 4: FINDINGS

Correlations between depression, marriage status, education, gender, occupation, involvement in litigation, and resource loss are presented in Table 2. Table 2's descriptives were from the original scale of 1-5, but in order to clarify the loss vs. gain dichotomy of Hobfoll's COR model they were recoded into three variables where 1 = gain 2 = no change and 3 = loss. The descriptives for the recode may be found in the appendix. A correlation matrix was then created to test the loss and demographic categories, and is presented in Table 3. The depression score was obtained by following Arata et al. (2000) and summing the three questions on feeling lonely, feeling blue, and how much time the respondent spent worrying about things.

The object resource loss score was created by summing five items inquiring about Prince William Sound natural resources, fishing, transportation, fishing gear and technology, and the availability of subsistence resources. The personal characteristic resource score was created by summing responses to questions asking about having a feeling of purpose in life, motivation to get things done, feelings of success, feeling valuable to others, and having a feeling of control over one's life. The energy resource score was obtained by summing the responses to questions about income, insurance, and retirement security. The condition resource score was summed of questions regarding family stability, happiness with one's partner or marriage, and health.

Table 2 Descriptive Statistics for Resource Loss

Variable	N=	Mean	Median	Standard Deviation
Personal Characteristic Resources				
Feeling that your life has purpose?	200	3.01	3	0.894
Feeling that you have control over your life?	205	2.65	3	0.925
Feeling of personal success	206	2.83	3	1.037
Feeling valuable to others	198	3.03	3	0.866
Feeling motivated to get things done	201	2.84	3	0.874
Feeling independent	201	2.86	3	0.924
Object Resources				
Commercial fishing?	186	1.82	2	0.906
Fishing gear / technology?	181	2.89	3	0.994
Personal transportation?	202	2.79	3	0.796
Prince William Sound natural resources?	196	1.96	2	0.844
Subsistence resources?	195	2.37	2	0.81
Energy Resources				
Adequate income?	203	2.48	3	1.021
Savings or emergency money?	200	2.35	2	1.045
Medical insurance?	194	2.72	3	0.919
Retirement security?	195	2.54	3	1.047
Time with loved ones?	193	2.7	3	0.88
Financial stability?	205	2.42	2	0.995
Condition Resources				
Family stability	195	2.76	3	0.894
Good marriage / partner	183	2.76	3	1.031
Personal health	204	2.66	3	0.686
Partner health	162	2.63	3	0.738

A bivariate correlation was performed showing how all resource loss categories positively correlated with one another in Table 4 with correlation scores of .414, .463, .532, .456, .577, .510 respectively ($p < .01$ two-tailed). Object resource loss positively correlated with being involved in the litigation (.329 $p < .01$). Personal characteristic resource loss positively correlated with involvement in litigation (.257 $p < .01$). Energy resources positively correlated involvement in the litigation (.399 $p < .01$) and commercial fishermen (.175 $p < .05$). Condition resource loss positively correlated involvement in the litigation (.223 $p < .01$). In addition, fisherman negatively correlated with gender (-.297 $p < .01$) and positively correlated with involvement in the litigation (.510 $p < .01$). Depression positively correlated with object resource loss (.242 $p < .01$), personal characteristic resource loss (.382 $p < .01$), energy resource loss (.289 $p < .01$), condition resource loss (.303 $p < .01$), gender (.189 $p < .01$), and involvement in the litigation (.225 $p < .05$). In addition, depression negatively correlated with education (-.206 $p < .01$) and being married (-.268 $p < .01$). Also, the results show marriage and an increase in education decreased the impact of resource loss such that higher education or being married reduced the chances someone experienced a loss.

Table 3 Correlations between Resource Loss, Depression, Demographics, Occupation, and Involvement in Litigation

Variable	1	2	3	4	5	6	7	8	9	10
1. Object Resource Loss	|									
2. Personal Characteristic Resource Loss	.414**	|								
3. Energy Resource Loss	.463**	.532**	|							
4. Condition Resource Loss	.456**	.577**	.510**	|						
5. Female	.045	.025	.109	.061	|					
6. Married	-.046	-.131	-.113	-.002	-.047	|				
7. Education	-.052	-.042	-.035	-.048	.008	.025	|			
8. Depression	.242**	.382**	.289**	.303**	.189**	-.268**	-.206**	|		
9. Commercial Fisherman	.132	.066	.175*	.008	-.297**	.101	-.075	.035	|	
10. Litigant	.329**	.257**	.399**	.223**	-.307	0.091	-.088	.225**	.510**	|

Note: $p < .05$ * (2-tailed) $p < .01$ ** (2-tailed) N=191

Hierarchical multiple regression was used in order to examine the importance of gender, marriage status, occupation, education, involvement in litigation, and resource loss in predicting depression with the results shown in Table 5 which included 188 cases (n=188). The predictor variables were entered in two blocks based on Conservation of Resources theory and previous research (Freedy et al. 1992, 1994; Marshall, Picou, and Gill 2004; Sattler et. al 2000, 2002). The first block includes litigant involvement, commercial fishing occupations, and demographics. This block was entered to test the influence of Cordova demographics on depression following the findings of their influence on stress by Picou, Marshall, and Gill (2004).

Block 2 enters the resource variables last in order to test the hypothesis that resource loss is the most important predictor for depression. Table 5 shows that the two predictor blocks accounted for 29% of depression variance $F(9,178)=8.061$, $p < .001$. The demographic block accounted for 19.8% of the variance, $F(5,182)=8.985$, $p < .001$, while resource loss accounted for an additional 9.2% of the variance. The beta coefficients indicated that depression was significantly associated with loss of personal characteristic resources, and was the only significant resource loss category. The largest portion of the variance was described by education, marriage, and gender.

Testing showed that there were no issues with multicollinearity. None of the values for tolerance approached .20 or below with the closest value being .553, and no VIF values fell above 4 the highest value being 1.810. In other words, the model worked well and presented little to no issues with excessive correlation between the predictor variables, as well as appropriate condition indexes of less than 30.

Table 4 Prediction of Depression by Resource Loss, Demographics, Occupation, and Involvement in Litigation

Variable	B	SEB	β	B	SEB	β
Step 1: Demographics						
Commercial Fisherman	-.162	.563	-.024	.065	.541	.009
Litigant	1.529	.485	.246**	.866	.502	.139
Female	1.114	.436	.179**	1.084	.419	.175**
Education	-.383	.141	-.181**	-.366	.134	-.173**
Married	-1.674	.415	-.269***	-1.462	.404	-.235***
Step 2: Resource Loss						
Condition				.136	.102	.113
Energy				-.016	.093	-.015
Personal Characteristic				.247	.088	.236**
Object				.030	.090	.025

Note: R^2 = .198 for step 1 ($p < .001$); ΔR^2 = .092 for Step 2 ($p < .001$)
$p < .05$ * $p < .01$ ** $p < .001$ *** N=191

CHAPTER 5: CONCLUSIONS AND DISCUSSION

This study analyzed the relationship between resource loss and depressive symptoms. At the bivariate level the results indicated that there was a strong correlation between depression and all resource loss categories. In addition, it should be noted that being married and an increase in education reduced the impact of resource loss. The correlation matrix shows that there is a positive relationship between being a female and depression, and a negative relationship between depression, education, and marriage. This indicated that being married and achieving a higher level of education made respondents less likely to be depressed. Tese findings supported the hypotheses that women are more likely to be effected by depression, the more education a person has the less likely they are to be influenced by depression, and marriage will reduce the impacts of depression. Variables such as age and number of children had minimal impact on the model, and were therefore omitted from the final models.

The appendix holding resource frequencies gives insight into the happenings of the community. Very few people are reporting gains in any category, and while many are reported no change, a number are still receiving losses. An important thing to note is that no change is only in relation to the oil spill, and while losses represent things that have gotten worse, it is entirely possible that the initial loss is still a serious problem for some residents although it may not have gotten any worse. The fact that very few gains are being reported means that there is hardly any improvement in the economic, social, and community aspects of Cordova, Alaska since the Exxon Valdez Oil Spill occurred. This is illustrated in both the bivariate and multivariate results, but the regression clearly illustrates the dejected feelings of the citizens.

Based on COR modeling loss is disproportionately weighted against gain. Few people are reporting gains, and most are claiming a loss or no change in their resource levels. The simple act of losing resources shows that some members of the community are still in "loss spirals," but the lack of resource gain also indicates that for many respondents they were unable to improve their situation. This is in keeping with the idea that stressful and depressive symptoms occur when resources are lost, threatened with loss, or when the respondents fail to gain following a resource investment (Hobfoll 1988, 2001). Respondents in Cordova are disproportionately weighted because they cannot buffer themselves against the initial loss by continuing a resource investment. This means that despite a significant amount of time passing since the accident that residents are unable to reinvest or require resources.

The multivariate analysis results showed that while demographics maintained the largest portion of the variance, personal characteristic resource loss continued to maintain a significant relationship towards depression, but the rest of the resource categories became statistically insignificant. As in the bivariate analysis, gender held a positive relationship with depression, and marriage and education maintained a negative relationship continuing to show support for hypothesis 1, 2, and 3. Hypothesis 4, maintaining that resource loss will influence depression over occupation or litigation, was supported in part through personal characteristic resource loss accounting for the largest portion of the variance when describing depressive symptoms. As a whole, the people in the sample are mostly persons who have remained in Cordova, and attempted to continue to live a normal life. They are attempting to weather the storm, but have obviously run into issues preventing a return to normalcy.

Their determination should have had an impact on the depressive symptoms due to resource loss, but it would appear the long recovery time, destruction of fishing jobs, and protracted litigation have caused many residents to have internal issues. This is supported through the Conservation of Resources model (Hobfoll, 1989), and extends the research of Arata et al. (2000). These findings suggest that depression may be associated with particular kinds of resource loss years after the initial stages of a technological disaster occur. It is possible that each resource category may not contribute equally to depression or distress during the later stages following disasters. It would appear that the people in this sample have been feeling long-term and long-lasting depression from the Exxon Valdez oil spill, to the point where they are suffering from deteriorating social support and health. Specutively, these findings seem to support the "social support deterioration model" of Kanisty and Norris (1993), which suggests that declines in social support account for a large share of victims' subsequent declines in mental health, buffering the findings of Arata and colleagues (2000) who examined fisherman in Corodova. It is likely the relationship between depression and personal characteristic resource loss were related because this form of resource loss measured internal states.

It is possible that technological disasters have lingering negative impacts on feelings of motivation, purpose, and value due to issues with the corrosive community. Marshall, Picou, and Schlichtman (2004) found similar issues surrounding stress and litigation after EVOS. This means the lingering effects of technological disasters have direct effects on stress and depression, and because of the adversarial nature that can surround these disasters it would appear that recovery is a long process. The general coping mechanisms would be of less use because the community cannot move beyond the event due to the lasting litigation, environmental impacts,

and resource loss. These feelings of helplessness contribute towards the deteriorating relationships in the community, and the result ends in depressive states.

This is consistent with the idea that technological disasters create chronic social disruption (Freudenburg & Jones, 1991). The changes in these relationships are similar to the findings that changes in health and symptom levels are attributable to stress-related illness (Evans & Edgerton, 1990; Holen, 1991). People may be avoiding coping mechanisms because these relationships are deteriorating, creating a reciprocal process each making the other worse. In other words, people are avoiding coping, which in turn has a negative effect on their relationships, which is similar to the findings of Arata et al. (2000).

The results point towards a similar trend with what other researches discovered about psychological distress after the acute stages of natural disasters (Freedy et al. 1992, 1994; Kaiser et al. 1996), and research should continue to examine the importance of each category individually in relation to outcomes of depression. Also, it is likely that different types of personal characteristic or condition resource loss, such as personal health or feelings of motivation, may relate to specific depression reactions as time moves away from the acute stages of the disaster. In addition, research should also recognize the important contribution of time in understanding community expectations for future trauma, and opportunities for longitudinal study would provide insight into the way community feelings change from the initial disaster reactions.

The multiple regression analysis indicated that litigation did not account for depression over gender, education, marriage status, or resource loss. While alone it did account for some of the variance with depression, it may be more likely that involvement in litigation is more closely

related to personal characteristic resource loss. Interestingly, litigation no longer becomes significant when the resource loss variables are included in the analysis. Perhaps the feelings of loss in motivation and personal success are reinforced by the post-disaster destruction of fishing supplies and resources. These results would suggest that the people involved in the litigation have lost hope, are unmotivated, and no longer feel successful. In other words, the destruction of their livelihood is more important than the stress litigation brings about even years after the event has occurred.

Past research suggests that persons involved in litigation are more likely to report symptoms of stress and PTSD. Picou, Marshall, and Gill (2004) illustrate that litigant involvement creates high levels of stress due to feelings of uncertainty, and the adversarial discourse they are generally pushed into. They conclude by discussing the way protracted litigation causes a secondary form of trauma, litigant stress.

It is also important to note that this research investigated depression years after the disaster had already occurred. It is possible that directly after, or in the initial few years after, that depression was considerably more prevalent in groups such as commercial fishermen. The results clearly show that there was no significant relationship between fishing occupations and depression. However, without longitudinal data it is impossible to determine if the conditions improved, or if they shifted employment to occupations less dependent on natural resources. It is entirely possible that people shifted their job focus, or simply left the area as time went on in an attempt to find better work. This methodological issue is true with most disaster studies as many researchers never exam post-disaster effects after their initial investigation.

Some of the participants obviously benefited from certain social institutions, such as marriage and education. The negative relationship between marriage and depression is supported by prior research, as people who may show signs of depression benefit from marriage more than people who are not married, and people who are married are more likely to have extensive social support networks (French & Williams 2007). In this case, it is also the largest predictor for the lack of depression in Cordova. The social support provided by a partner is clearly having a large influence on the internal states of respondents, and this support is obviously having an impact on depressive symptoms. Additionally, the resource dependency of Cordova means people with more education are less likely to be in low wage or resource dependent jobs. In just looking at the frequency, it may also be noted that there are fewer highly educated individuals in the area, and there is an extremely slight possibility that an increase in this part of the population could shift the relationship. The more likely result is that the highly educated are more likely to leave Cordova for more prominent areas, such as major cities. This relationship is not unexpected, and future research may look at the exclusively at the less educated.

The findings may be taken with caution as it is unlikely that Cordova is an appropriate representation of the general population after a technological disaster. However, it can be noted that as a resource dependent community this research may have pragmatic implications for disaster research. The acceptance of the Conservation of Resources model suggests that personal characteristic and condition resources should be a focus for restoration even a decade after the initial event occurred. Personal characteristic resources may be focused on by creating, and continuing, emotional support groups (Sattler and Freedy, 1995). Condition resources will most

likely hinge on providing adequate health care services over time, as family and marriage stability are more likely to be issues during acute stages rather than a decade later. However, it is also more likely that due to the technological nature of the event, that these organizational needs are less likely to be met as the blame is place squarely on an organization. The ultimate response, both initially, and over time will be determined by the swiftness of the litigation and the speed with which the community can recover during, and after clean-up.

Certain limitations of the study include the use of self-reported data in order to assess depression and resource loss which could be exaggerated or inaccurate. However, Norris and Kaniasty (1992), conducted a study of reliability in delayed self-reports in disaster research, and found that self-report data had a high reliability. In addition, there could be a concern that the length of time has allowed for other events besides the spill to influence response of the community since 1989. To address this, respondents were specifically asked to think of their responses in "relation to the spill," but it is still possible other events may have provided some influence. This may have limited the ability of the study to clearly link psychological well-being and resource loss, but the analysis supports Hobfoll's COR model. In addition, it may be difficult to translate these results to the greater population due to the unique nature of resource dependency by Cordova residents, but despite this, the findings are consistent with the results of other disaster research (Kaiser et al. 1996; Sattler et al. 2002).

Over all, the results indicate that the effects of EVOS on the residents of Cordova have been long-lasting, and are related to symptoms of depression. Studies on effect of the clean-up process, and more research extending Picou, Marshall, and Gill (2004) on the litigation process is needed. Research should continue to examine the differences between technological and

natural disasters, but additional effort should also be taken to understand their similarities. Future research should continue to investigate the relationship between personal characteristic and condition resources with depression, and attempt to discern which losses have a greater impact on psychological well-being. Longitudinal studies from the acute period until decades later are needed. It is also possible that these particular resource categories are influencing coping mechanisms. Their focus on the deterioration of relationships is consistent with research that investigated avoidant coping, and the possible negative effects it may have on relationships (Arata et al., 2000). Continued research investigating these relationships is needed.

APPENDIX: DEMOGRAPHICS OF RESOURCE LOSS

Table 5 Frequency Table for Condition Resources

Variable	Frequency	Percent
Family stability (n=195)		
Gain	29	14.9
No change	101	51.8
Loss	65	33.3
Good marriage / partner (n=183)		
Gain	32	17.5
No change	90	49.2
Loss	61	33.3
Personal health (n=204)		
Gain	7	3.5
No change	133	65.2
Loss	64	31.4
Partner health (n=161)		
Gain	5	3.7
No change	103	63.6
Loss	53	32.8

Table 6 Frequency Table for Energy Resources

Variable	Frequency	Percent
Adequate income (n=203)		
Gain	30	14.8
No change	76	37.4
Loss	97	47.8
Savings & emergency money (n=200)		
Gain	25	12.5
No change	65	32.5
Loss	110	55
Medical insurance (n=194)		
Gain	22	11.3
No change	115	59.3
Loss	57	29.4
Retirement security (n=189)		
Gain	22	14.4
No change	85	43.6
Loss	82	42
Time with loved ones (n=193)		
Gain	27	14
No change	90	46.6
Loss	76	39.4
Financial stability (n=205)		
Gain	26	12.7
No change	73	35.6
Loss	106	51.7

Table 7 Frequency Table for Object Resources

Variable	Frequency	Percent
Commercial fishing (n=186)		
Gain	8	4.3
No change	32	17.2
Loss	146	78.5
Fishing gear and technology (n=181)		
Gain	45	24.8
No change	82	45.3
Loss	54	29.8
Personal transportation (n=202)		
Gain	23	11.4
No change	120	59.4
Loss	59	29.2
Prince William Sound natural resources (n=196)		
Gain	4	2
No change	51	26
Loss	141	72
Subsistence resources (n=195)		
Gain	9	4.1
No change	86	44.1
Loss	101	51.8

Table 8 Frequency Table for Personal Characteristic Resources

Variable	Frequency	Percent
Feeling that your life has purpose (n=157)		
Gain	43	21.5
No change	113	56.5
Loss	44	22
Feeling that you have control over your life? (n=227)		
Gain	29	14.1
No change	96	46.8
Loss	80	39
Feeling of personal success (n=206)		
Gain	52	25.3
No change	82	39.8
Loss	72	35
Feeling valuable to others (n=198)		
Gain	46	23.3
No change	110	55.6
Loss	42	21.2
Feeling motivated to get things done (n=201)		
Gain	33	16.4
No change	109	54.2
Loss	59	29.4
Feeling independent (n=201)		
Gain	36	17.9
No change	104	51.7
Loss	61	30.4

REFERENCES

Albala-Bertrand, J. M. (2000). Complex Emergencies vs Natural Disasters: An analtyical comparison of causes and effects. *Oxford Development Studies, 28*, 187-204.

Arata, C. M., Picou, J. S., Johnson, G. D., & McNally, T. S. (2000). Coping with technological disasters: An application of the Conservation of Resources Model to the Exxon Valdez Oil Spill. *Journal of Traumatic Stress, 13*, 23-39.

Asgary, A., & Willis, K. (1997). Household behavior in response to earthquake risk: An assessement of alternative theories. *Disasters, 21*(4), 354-365.

Barton, A. H. (1969). *Communities in Disaster: A Sociological Analysis of Collective Stress Situations*. Garden City, NY: Doubleday.

Baum, A., & Fleming, I. (1993). Implications of psychological research on stress and technological accidents. *American Psychologist, 48*(6), 665-672.

Benight, C. C., Ironson, G., Kelebe, K., Carver, C., Wynings, C., Burnett, K., et al. (1999). Conservation of resources and coping self-efficacy predicting distress following a natural disaster: A causal model analysis where the environment meets the mind. *Anxiety, Stress, and Coping, 12*, 107-126.

Benotsch, E. G., Brailey, K., Vasterling, J. J., Uddo, M., Constans, J. I., & Sutker, P. B. (2000). War zone stress, personal and environmental resources, and PTSD symptoms in Gulf War veterans: A longitudinal perspective. *Journal of Abnormal Psychology, 109*, 205-213.

BND. (1999). *Reducing disaster losses through better information*: National Academies Press.

Bradfield, C., Ectherling, L. G., & Wylie, M. L. (1989). After the flood: The response of ministers to a natural disaster. *Sociological Analysis, 49*(4), 397-407.

Brotheridge, C. M., & Lee, R. T. (2002). Testing a conservation of resources model of the dynamics of emotional labor. *Journal of Occupational Health Psychology, 7*(1), 57-67.

Brown, L. R. (Ed.). (2000). *State of the World 2000*. New York: W.W. Norton & Company Ltd.

Burby, R. J., Bollens, S. J., Kaiser, E. J., Mullan, D., & Sheaffer, J. R. (1988). *Cities Under Water: A Comparative Evaluation of Ten Cities' Efforts to Manage Floodplain Land Use*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Carver, C. (1993). *Coping with Hurricane Andrew*. Paper presented at the 15th International Conference of the Stress and Anxiety Research Society.

Center, A. D. R. (2002). Regional workshop on networking and collaboration among non-governmental organizations of asian countries in disaster reduction and response. Retrieved March, 2008, from http://www.adrc.or.jp/publications/ngo_workshop/adrrn2002.htm

Clarke, L., & Short, J. F. (1993). Social organization and risk: Some current controversies. *Annual Review of Sociology, 19*, 375-399.

Cohen, M. J. (1997). Economic IMpacts of the Exxon Valdez Oil Spill. In J. S. Picou, D. A. Gill & M. J. Cohen (Eds.), *The Exxon Valdez Disaster: Readings on a modern social problem*. Dubuque, IA: Kendall-Hunt.

Cohen, R. (1992). Training mental health professionals to work with families in diverse cultural contexts. In L. S. Austin (Ed.), *Responding to disaster: A guide for mental health professionals* (pp. 69-80). Washington, DC: American Psychiatric Press.

Cook, J., & Bickman, L. (1990). Social support and psychological symptomatology following a natural disaster. *Journal of Traumatic Stress, 3*, 541-556.

Corder, M. C. (2005). Tsunami death toll rises to about 160,000. *The Charlotte Observer*, from https://www.highbeam.com/reg/reg1.aspx?full=yes&refid=ency_prev&origurl=/doc/1P1-104038296.html

Cordes, C. L., & Dougherty, T. W. (1993). A review and an integreation of research on job burnout. *Academy of Management Review, 18*, 621-656.

Couch, S. R. (1996). Environment contamination, community transformation and the Centralia Mine Fire. In J. K. Mitchell (Ed.), *The Long Road to Recovery: Community Response to Industrial Disaster*: United Nations University Press.

Couch, S. R., & Kroll-Smith, J. S. (1985). The chronic technical disaster: Toward a social scientific perspective. *Social Science Quarterly, 66*, 564-575.

Council, E. T. (1999). *Recovery of Injured Resources and Services: 1999 Update*. Anchorage: State of Alaska and National Oceanic and Atmospheric Administration

Council, E. T. (2002). *Exxon Valdez Oil Spill Restoration Plan: Update on Injured Resources and Services*. Anchorage: State of Alaska and National Oceanic and Atmospheric Administration.

Crabbs, M. A., & Heffron, E. (1981). Loss associated with a natural disaster. *Personal and Guidance Journal 59*, 378-382.

Cuthbertson, B. H., & Nigg, J. M. (1987). Technological Disaster and the Nontherapeutic Community. *Environment and Behavior, 19*(4), 462-483.

Cutherbertson, B. H., & Nigg, J. M. (1987). Technological Disaster and the Nontherapeutic Community. *Environment and Behavior, 19*, 462-483.

Davidson, L. M., & Baum, A. (1991). Victimization and self-blame following a technological disaster. In S. R. Couch & J. S. Kroll-Smith (Eds.), *Communities at Risk: Collective Response to Technological Hazards* (pp. 33-52). New York, NY: Peter Lang.

Dekel, R., & Hobfoll, S. E. (2007). The impact of resource loss on Holocaust survivors facing war and terrorism in Israel. *Aging and Mental Health, 11*, 159-167.

Douglas, M., & Wildavsky, A. (1982). *Risk and culture: An essay on the selection of technical and environmental dangers*. Berkeley, CA: University of California Press.

Drabek, T. E. (1986). *Human system responses to disaster: An inventory of sociological findings*: Springer-Verlag

Dynes, R. R., & Tierney, K. (Eds.). (1994). *Disasters, Collective Behavior and Social Organization*. Newark, DE: University of Delaware Press.

Edelstein, M. R. (1988). *Contaminated Communities: The Social and Psychological Impacts of Residential Toxic Exposure*. Boulder, CO: Westview Press.

Edelstein, M. R., & Wandersman, A. (1987). Community dynamics in coping with toxic exposure. In I. Altman & A. Wandersman (Eds.), *Neighborhood and Community Environments* (Vol. 9). New York: Plenum Press.

Erikson, K. (1976). *Everything in Its Path: Destruction of Community in the Buffalo Creek Flood*: Simon & Schuster.

Erikson, K. (1976). Loss of communality at Buffalo Creek. *American Journal of Psychiatry, 133*, 302-305.

Erikson, K. (1994). *A new species of trouble: Exploration in disasters, trauma, and community*. New York, NY: Norton.

Escalares, M., Anbarci, N., & Register, C. A. (2007). Public sector corruption and major earthquakes: A potential deadly interaction. *Public Choice, 132*, 209-230.

Evans, G., Wener, R., & Philips, D. (2002). The morning rush hour: Predictability and commuter stress. *Environment and Behavior, 34*(4), 521-530.

Folkman, S., & Lazarus, R. S. (1988). Coping as a mediator of emotion. *Journal of Personality and Social Psychology, 54*, 466-475.

Freedy, J. R., Saladin, M. E., Kilpatrick, D. G., Resnick, H. S., & Saunders, B. E. (1994). Understanding acut psychological distress following a natural disaster. *Journal of Traumatic Stress, 7*(2), 257-273.

Freedy, J. R., Shaw, D. L., Jarrel, M. P., & Master, C. R. (1992). Toward an understanding of the psychological impact of disasters. *Journal of Traumatic Stress, 5*, 441-454.

Freudenburg, W. R. (1993). Risk and recreancy: Weber, the division of labor, and the rationality of risk perceptions. *Social Forces, 71*, 909-932.

Freudenburg, W. R. (1997). Contamination, corrosion, and the social order: An overview. *Current Sociology, 45*, 19-40.

Freudenburg, W. R. (2000). The 'risk society' reconsidered: Recreancy, the division of labor, and risk to the social fabric. In M. J. Cohen (Ed.), *Risk in the Modern Age: Social Theory, Science and Environmental Decision-Making*: St. Martin's Press.

Freudenburg, W. R., & Jones, T. R. (1991). Attitudes and stress in the presence of technological risk: A test of the Supreme Court hypothesis. *Social Forces, 69*, 1143-1168.

Fritz, C. E. (Ed.). (1961). *Disasters*. New York, NY: Harcourt, Brace & World.

Galea, S., Ahem, J., Resnick, H. S., Kilpatrick, D. G., Bucuvalas, M., Gold, J., et al. (2002). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346*(13), 982-987.

Gill, D. A., & Picou, J. S. (1998). Technological disaster and chronic community stress. *Society and Natural Resources, 11*, 795-815.

Glass, D., & Singer, J. (1972). *Urban stress: Experiments on onise and social stressors*. New York: Academic Press.

Grabowski, M., & Roberts, K. H. (1997). Risk mitigation in large scale systems: Lessons from high reliability organizaitons. *California Management Review, 39*, 152-162.

Grandey, A. A., & Cropanzano, R. (1998). The conservation of resources model applied to work-family conflict strain. *Journal of Vocational Behavior, 54*, 350-370.

Green, B. L., & Lindy, J. D. (1994). Post-traumatic stress disorder in victims of disasters. *Psychiatric Clinics of North America, 17*, 301-309.

Gunter, V. J., Aronoff, M., & Joel, S. (1999). Toxic contamination and communities: Using an ecological-symbolic perspective to theorize response contingencies. *Sociological Quarterly, 40*, 623-640.

Hallman, W. K., Short, J. W., & Rice, S. D. (1999). Attribution of responsibility and individual and collective coping with environment threats. *Journal of Social Issues, 48*, 101-118.

Hartsough, D. M. (1982). Planning for disasters: A new community outreach program for mental health centers. *Journal of Community Psychology, 10*, 255-264.

Hobfoll, S. E. (1988). Conservation of Resources: A new attempt at conceptualizing stress. *American Psychologist, 44*, 513-524.

Hobfoll, S. E. (1989). *The Ecology of Stress*. New York, NY: Plenum.

Hobfoll, S. E. (2001). The Influence of Culture, Community, and the Nested-Self in the Stress Process: Advancing conservation of resources theory. *Applied Psychology: An International Review, 50*, 337-421.

Hobfoll, S. E., Canetti-Nisim, D., & Johnson, R. J. (2006). Exposure to terrorism, stress-related mental health symptoms, and defensive coping among Jews and Arabs in Israel. *Journal of Consulting and Clinical Psychology, 74*, 207-218.

Hobfoll, S. E., & Lilly, R. S. (1993). Resource conservation as a strategy for community psychology. *Journal of Communication Psychology, 21*, 128-148.

Hobfoll, S. E., & Shirom, A. (1993). Stress and burnout in work organizations. In R. T. Golembiewski (Ed.), *Handbook of Organization Behavior* (pp. 41-61). New York: Marcel Dekker.

Hood, C., & Jackson, M. (1992). *The new public management: a recipe for disaster?* London: James and James Science Publishers.

IFRC. (2008). World Disasters Report. Retrieved March, 2008, from http://www.ifrc.org/publicat/wdr2007/summaries.asp

Ironson, G., Wynings, C., Schneider, D., Baum, A., Rodriguez, M., Greenwood, D., et al. (1997). Posttraumatic stress symptoms, intrusive thoughts, loss, and immune function after Hurricane Andrew. *Psychosomatic Medicine, 59*, 128-141.

Janssen, P., Schaufeli, W. B., & Houkes, I. (1999). Work-related and individual determinants of the three burnout dimensions. *Work and Stress, 13*, 74-86.

Joyner, K., & Swenson, C. C. (1993). Community-level intervention after a disaster. In C. F. Saylor (Ed.), *Children and Disaster* (pp. 211-231). New York: Plenum.

Kaiser, C. F., Sattler, D. N., Bellack, D. R., & Dersin, J. (1996). A conservation of resources approach to a natural disaster: Sense of coherence and psychological distress. *Journal of Social Behavior and Personality, 11*, 459-476.

Karanci, N. A., & Aksit, B. (1998). Strengthening community participation in disaster management by strengthening governmental and non-governmental organisations and networks: A case study from Dinar and Bursa (Turkey). *Australian Journal of Emergency Management, Summer*(1998/99), 35-39.

Karanci, N. A., & Rüstemli, A. (1995). Psychological consequences of the 1992 Erzincan (Turkey) earthquake. *Disasters, 19*(1), 8-18.

Kasapoglu, A., Ecevit, Y., & Ecevit, M. (2004). Support needs of the survivors of the August 17, 1999 earthquake in Turkey. *Social Indicators Research, 66*(3), 229-249.

Kasperson, R. E., Golding, D., & Tuler, S. (1992). Social distrust as a factor in siting hazardous facilities and communicating risks. *Journal of Social Issues, 48*(4), 161-187.

Kasperson, R. E., & Pijawka, K. D. (1985). Societal response to hazards and major hazard events: Comparing natural and technological hazards. *Public Administration Review, 45*, 7-18.

Kirby, A. (1990). *Nothing to Fear*. Tuscon: The University of Arizona Press.

Kroll-Smith, J. S., & Couch, S. R. (1990). *The real disaster is above ground: A mine fire and social conflict*: University Press of Kentucky.

Krug, E. G., Kresnow, M., Peddicord, J. P., Dahlberg, L. L., Powell, K. E., Crosby, A. E., et al. (1998). Suicide after natural disasters. *New England Journal of Medicine, 338*(6), 373-378.

Lange, L., Fleming, R., & Toussaint, L. (2004). Risk perceptions and stress during the threat of explosion from a railroad accident. *Social Behavior and Personality, 32*, 117-128.

Lechat, M. F. (1990). Updates: The epidemiology of health effects of disasters. *Epidemiologic Reviews, 12*, 192-197.

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology, 81*, 123-133.

Levine, A. G. (1982). *Love Canal: Science, politics, and people*. Lexington, MA: Lexington Books.

Lord, N. (1997). Oil in the sea: Initial biological impacts of the Exxon Valdez oil spill. In J. S. Picou, D. A. Gill & M. J. Cohen (Eds.), *The Exxon Valdez Disaster: Readings on a Modern Social Problem* (pp. 95-109). Dubuque, IA: Kendall-Hunt.

Marshall, B. K., Picou, J. S., & Schlichtmann, J. (2004). Technological disasters, litigation stress, and the use of alternative dispute resolution mechanisms. *Law & Policy, 26*(2), 289-307.

McCubbin, H. I., & Patterson, J. M. (1983). The family stress process. In H. I. McCubbin, M. B. Sussman & J. M. Patterson (Eds.), *Social Stress and the Family: Advances and Developments in Family Stres Theory and Research* (pp. 7-37). New York: Haworth Press.

McFarlane, A. C. (Ed.). (1995). *Stress and disaster*. The Netherlands: Kluwer Academic Publishers.

Mulilis, J. P., Duval, T. S., & Lippa, R. (1990). The effects of a large destructive local earthquakes on earthquake preparedness as assessed by an earthquake preparedness scale. *Natural Hazards, 3*, 357-371.

Myers, D. G. (1989). Mental health and disaster. In R. Gist & B. Lubin (Eds.), *Psychosocial Aspects of Disaster* (pp. 190-228). New York: John Wiley & Sons.

Neumayer, E., & Pluemper, T. (2007). *The Gendered Nature of Natural Disasters: The Impact of Catastrophic Events on the Gender Gap in Life Expectancy, 1981-2002*. (SSRN o. Document Number)

Neveu, J.-P. (2007). Jailed resources: Conservation of resources theory as applied to burnout among prison guards. *Journal of Organizational Behavior, 28*(1), 21-42.

Nigg, J. M., & Cutherbertson, B. H. (1982). Pesticide applications near urban areas: A 'crisis of confidence' for public health agencies. *Journal of Health and Human Resources Administration, 4*, 284-302.

Noji, E. K. (2005). Disasters: introduction and state of the art. *Epidemiologic Reviews, 27*(1), 3-8.

Noji, E. K. (Ed.). (1997). *The nature of disaster: General characterstics and public health effects*. Oxford, NY: Oxford University Press.

Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology*(60), 409-418.

Norris, F. H. (2005). Range, magnitude, and duration of the effects of disasters on mental health. Retrieved November, 2007, from http://www.redmh.org/research/general/effects.html

Norris, F. H., Perilla, J. L., Riad, J. K., Kaniasty, K., & Lavizzo, E. A. (1999). Stability and change in stress, resources, and psychological distress following a natural disaster: Findings from Hurricane Andrew. *Anxiety, Stress, and Coping, 12*, 363-396.

NRC. (1999). *Reducing Disaster Losses through Better Information*. Washington, D.C.: National Academy Press.

Palinkas, L. A., Downs, R., & Peterson, J. S. (1992). Ethnic differences in stress, coping, and depressive symptoms after the Exxon Valdez oil spill. *Journal of Nervous and Mental Disease, 180*, 287-295.

Palinkas, L. A., Peterson, J. S., Russell, J., & Downs, M. A. (1993). Community patterns of psychiatric disorders after the Exxon Valdez Oil Spill. *American Journal of Psychiatry, 150*, 1517-1523.

Perrow, C. (1999). *Normal Accidents: Living with high-risk technologies*. Princeton, NJ: Princeton University Press.

Picou, & Gill (Eds.). (1996). *The Exxon Valdez Oil Spill and chronic psychological stress*.

Picou, J. S., & Gill, D. A. (2000). The Exxon Valdez disaster as localized environmental catastrophe: Dissimilarities to risk society theory. In M. J. Cohen (Ed.), *Risk in the Modern Age: Social Theory, Science, and Environmental Decision-Making*: Macmillan.

Picou, J. S., Gill, D. A., & Cohen, M. J. (Eds.). (1997). *The Exxon Valdez Disaster: Readings on a Modern Social Problem*: Kendall-Hunt.

Picou, J. S., Gill, D. A., Dyer, C. L., & Curry, E. W. (1992). Stress and disruption in an Alaskan fishing community: Initial and continuing impacts of the Exxon Valdez oil spill. *Industrial Crisis Quarterly, 6*, 235-257.

Picou, J. S., Marshall, B. K., & Gill, D. A. (2004). Disaster, litigation, and the corrosive community. *Social Forces, 82*, 1493-1521.

Picou, J. S., & Rosebrook, D. R. (1993). Technological accident, community class action litigation and scientific damage assessment: A case study of court-ordered research. *Sociological Spectrum, 13*, 117-138.

Pilisuk, M., & Parks, S. H. (1981). The place of network analysis in the study of supportive associations. *Basic and Applied Social Psychology, 2*, 121-135.

Querentelli, E. L. (1998). *What is Disaster? Perspectives on the Question*. London: Routledge.

Querentelli, E. L., & Dynes, R. R. (1977). Response to social crisis and disaster. *Annual Review of Sociology, 3*, 23-49.

Rapport, E. (Ed.). (1998). *Preliminary Report: Hurricane Andrew 16-28 August, 1992*.

Richardson, B. (1994a). Crisis management and the management strategy: Time to "loop the loop". *Disaster Prevention and Management, 6*(5), 349-355

Richardson, B. (1994b). Socio-technical disasters: Profile and prevelance. *Disaster Prevention and Management, 3*(4), 41-69.

Rincon, E., Linares, M., & Greenberg, B. (2001). Effect of previous experience of a hurricane on preparedness for future hurricanes. *The American Journal of Emergency Medicine, 19*(4), 276-279.

Ritchie, L. A., & Gill, D. A. (2007). Social Capital Theory as an Integrating Framework for Technological. Disaster Research. *Sociological Spectrum, 27*, 1-26.

Rubonis, A. V., & Bickman, L. (1991). Psychological impairment in the wake of disaster: The disaster-psychopathology relationship. *Psychological Bulletin, 109*, 384-399.

Sattler, D. N., Preston, A. J., Kaiser, C. F., Olivera, V. E., Valdez, J., & Schlueter, S. (2002). Hurricane Georges: A cross-national study examining preparedness, resource loss, and psychological distress in the U.S. Virgin Islands, Puerto Rico, Dominican Republic, and the United States. *Journal of Traumatic Stress, 15*(5), 339-350.

Schneider, D. (1993). Alaska's unsound salmon fishery. *Pacific Fishing, 42(June)*, 36-39.

Shaluf, I. M. (2007). An overview on technological disasters. *Disaster Prevention and Management, 16*(3), 380-390.

Shrivastava, P. (1994). The evolutino of research on technological crises in the US. *Journal of Contingencies and Crisis Management, 2*(1), 10-20.

Smith, K. (1992). *Environmental Hazards: Assessing risk and reducing disaster*. New York, NY: Routledge.

Solomon, Z. (1989). A 3 year prospective study of posttraumatic stress disorder in Israeli combat veterans. *Journal of Traumatic Stress, 2*, 59-73.

Spiegel, P. B. (2005). Differences in world responses to natural disasters and complex emergencies. *The Journal of the American Medical Association, 293*, 1915-1918.

Sturgeon, D. (Ed.). (1993). *Posttraumatic stress disorder*. London: Academic Press.

Tierney, K. (1989). The social and community contexts of disaster. In R. Gist & B. Lubin (Eds.), *Psychosocial aspects of disaster* (pp. 11-39). New York: John Wiley Sons.

Turner, B., & Pidgeon, N. (1997). *Man-made disasters* (Second Edition ed.). London: Butterworth Heinemann.

UNEP. (2005). *GEO Year Book 2004/5: An overview of our changing environment*: United Nations Environment Programme.

Vyner, H. M. (1988). *Invisible trauma: the psychosocial effects of invisible environmental contaminants*. Lexington, MA: Lexington Books.

Weiner, B. (1993). On sin versus sickness: A theory of perceived responsibility and social motivation. *American Psychologist, 48*, 957-965.

Weiner, B. (1995). *Judgements of Responsibility: A Foundation for a Theory of Social Conduct*. New York: Guilford.

Westman, M., & Eden, D. (1997). Effects of a respite from work on burnout: Vactaion relief and fade-out. *Journal of Applied Psychology, 82*, 516-527.

Wortman, C. B., & Brehm, J. W. (1975). Responses to uncontrollable outcomes: An integration of reactance theory and the learned helplessness model. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 8, pp. 277-336). New York: Academic Press.

Wright, T. A., & Cropanzano, R. (1998). Emotional exhaustion as a predictor of job performance and voluntary turnover. *Journal of Applied Psychology, 83*, 486-493.

Zavestoski, S., Mignano, F., Agnello, K., Darroch, F., & Abrams, K. (2002). Toxicity and complicity: Explaining consensual community response to a chronic technological disaster. *The Sociological Quarterly*, *43*(3), 385-406.