Behavioral Science Perspectives on Resilience

CARRI Research Report 10

Community & Regional RESILIENCE Institute

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BEHAVIORAL SCIENCE PERSPECTIVES ON RESILIENCE

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RESEARCH FINDINGS ABOUT COMMUNITY AND REGIONAL RESILIENCE

One of the commitments of the Community and Regional Resilience Institute (CARRI) is to understand what resilience is and how to get there, based on research evidence.

As one resource for this effort, CARRI has commissioned a number of summaries of existing knowledge about resilience, arising from a number of different research traditions. This paper is one in a series of such summaries, which will be integrated with new resilience explorations in several CARRI partner cities and with further discussions with the research community and other stakeholders to serve as the knowledge base for the institute.

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COMMUNITY AND REGIONAL RESILIENCE INSTITUTE

Oak Ridge National Laboratory's (ORNL) Community and Regional Resilience Institute (CARRI) is a program of the Congressionally funded Southeast Region Research Initiative. CARRI is a regional program with national implications for how communities and regions prepare for, respond to, and recover from catastrophic events. CARRI will develop the processes and tools with which communities and regions can better prepare to withstand the effects of natural and human-made disasters by collaboratively developing an understanding of community resilience that is accurate, defensible, welcomed, and applicable to communities across the region and the nation.

CARRI is presently working with three partner communities in the Southeast: Gulfport, Mississippi; Charleston/ Low Country, South Carolina; and the Memphis, Tennessee, urban area. These partner communities will help CARRI define community resilience and test it at the community level. Using input from the partner communities, lessons learned from around the nation, and the guidance of ORNL-convened researchers who are experts in the diverse disciplines that comprise resilience, CARRI will develop a community resilience framework that outlines processes and tools that communities can use to become more resilient. Of critical importance, CARRI will demonstrate that resilient communities gain economically from resilience investments.

From its beginning, CARRI was designed to combine community engagement activities with research activities. Resilient communities are the objective, but research is critical to ensure that CARRI's understanding is based on knowledge-based evidence and not just ad hoc ideas—we want to get it right. To help with this, CARRI has commissioned a series of summaries on the current state of resilience knowledge by leading experts in the field. This kind of interactive linkage between research and practice is very rare.

In addition to its partner communities and national and local research teams, CARRI has established a robust social network of private businesses, government agencies, and non-governmental associations. This network is critical to the CARRI research and engagement process and provides CARRI the valuable information necessary to ensure that we remain on the right path. Frequent conversation with business leaders, government officials, and volunteer organizations provide a bottom-up knowledge from practitioners and stakeholders with real-world, on-the-ground experience. We accept that this program cannot truly understand community resilience based only on studies in a laboratory or university. CARRI seeks to expand this social network at every opportunity and gains from each new contact.

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LIST OF RESEARCH REPORTS BY NUMBER

CARRI Report 1: Susan L. Cutter, Lindsey Barnes, Melissa Berry, Christopher Burton, Elijah Evans, Eric Tate, and Jennifer Webb, *Community and Regional Resilience: Perspectives from Hazards, Disasters, and Emergency Management*, September 2008.

CARRI Report 2: Susanne C. Moser, *Resilience in the Face of Global Environmental Change*, September 2008.

CARRI Report 3: Craig Colten, Robert Kates, and Shirley Laska, *Community Resilience: Lessons from New Orleans and Hurricane Katrina,* September 2008.

CARRI Report 4: Betty Hearn Morrow, *Community Resilience: A Social Justice Perspective*, September 2008.

CARRI Report 5: Lance Gunderson, *Comparing Ecological and Human Community Resilience*, January 2009.

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CARRI Report 7: Thomas J. Wilbanks, *How Geographic Scale Matters in Seeking Community Resilience*, August 2009.

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BEHAVIORAL SCIENCE PERSPECTIVES ON RESILIENCE: INTRODUCTION TO THE REVIEW

Decades of research on the human stress response, both experimental and observational in method, have yielded a wealth of knowledge that is directly relevant to understanding the human capacity to adapt to a wide variety of stressful events and situations. The behavioral sciences, especially the various disciplines of psychology, have been concerned primarily with the resilience of individuals, in particular with understanding the biological, cognitive, emotional, and behavioral processes that protect persons from harm and promote their well-being and growth.

Given CARRI's mission to promote *community* resilience, it is important that leading scholars in behavioral science have recognized that the resilience of individuals is dependent upon the resilience of the communities in which they are embedded. Such an ecological perspective is especially appropriate in the context of collective stressors, such as disaster. After all, community members' postdisaster well-being depends in part on the effectiveness of organizational responses, and ultimately the purpose of disaster management is to ensure the health and safety of the public. For this reason, the prevalence of psychological wellness in the community is one important criterion for evaluating community resilience in the aftermath of extreme events. Within limits, postdisaster distress is normal, but when highly prevalent, severe, or persistent, it points to systemic needs, societal problems, or response failures. In short, community mental health is the *sine qua non* of community resilience.

It is equally important to recognize that the resilience of communities is dependent upon the resilience of the individuals who compose them. Influences between individual and community are mutual, transactional, and bidirectional. Effective promotion of community resilience therefore requires knowledge of the various psychological factors that influence individual and collective behavior before and after adverse events. Accordingly, the purpose of this review is to summarize perspectives from behavioral science that are useful for understanding the resilience of individuals. The review gives particular attention to those concepts that are likely to be most specific to a behavioral science perspective, relative to sociological or natural science perspectives. Thus, the review focuses heavily on how human cognitions (e.g., core belief systems, appraisals, attributions) influence action (i.e., goal-directed behavior).

The review is organized into four primary parts. Section 1 presents an overview of resilience perspectives in behavioral science. Here the emphasis is on the big picture: What is resilience, how is it manifested, how common is it, and where does it come from? The next two sections of the review are organized according to the four "characteristics" of a resilient community outlined by CARRI.

- It ***anticipates*** problems, opportunities, and the potential for surprise.
- It ***reduces*** vulnerabilities to development paths, socioeconomic conditions, and identified threats.
- It ***responds*** effectively, fairly and legitimately.
- It ***recovers*** rapidly, safely, and fairly.

As will be seen, the behavioral science literature makes clear linkages between the characteristics outlined by CARRI; for example, anticipation of harm leads to actions that reduce vulnerabilities. Section 2 of this review (Anticipation and Reduction of Vulnerabilities) describes core belief systems (schemas) that underlie the human ability to anticipate problems and opportunities and focuses on precaution adoption and collective action as illustrative

behaviors that aim to reduce vulnerabilities of individuals and groups. Section 3 (Response and Recovery) describes core concepts from stress research that indicate how individuals respond to adversity, with a focus on cognitive appraisals, ways of coping, and social support dynamics. The final section, Section 4 (Implications), describes how the concept of resilience creates a coherent framework for integrating interventions that vary in their timing and target.

Before proceeding, I should add a note about how this review was conducted. The material came from three primary sources: a systematic search for recently published articles on psychological resilience; the author's preexisting knowledge of key writings in stress research and theory over the past 25 years; and a specific search for relevant reviews and meta-analyses in journals such as *Psychological Bulletin* and *Clinical Psychology Review*. The challenge was to be neither too narrow nor too broad in scope. A review limited to the results of a search on "resilience" would be severely flawed. Relatively little of the relevant work in behavioral science explicitly mentions resilience, leading many previous writers to conclude that resilience has been under-recognized and under-studied. However, a careful reading of the stress and coping literature challenges this view and instead points to a long-standing concern with factors that promote human adaptation, development, and well-being. Thus this review summarizes major works that identify the cognitive, emotional, and behavioral underpinnings of stress anticipation, mitigation, response, and recovery regardless of whether or not a resilience frame was used by the authors. On the other hand, it was not possible to review the thousands of studies that have addressed this report's major themes. For this reason, I relied heavily on key conceptual papers, prior reviews, and noteworthy meta-analyses to identify the most important perspectives to summarize. While I aimed to be specific enough to show the attention to mechanism that is characteristic of behavioral science, I glossed over some nuances that seemed less essential. I tried to strike a balance between old and new, by including references to classic papers, as well as recent advancements.

1. OVERVIEW: RESILIENCE FRAMEWORKS, CORE CONCEPTS, AND PRINCIPLES FROM BEHAVIORAL SCIENCE

1.1 Meanings of Resilience

In the behavioral sciences, resilience has been defined variously as the process of, capacity for, or outcome of successful adaptation after trauma, adversity, or severe stress. In his influential *American Psychologist* article, George Bonanno (2004) argued that it is important to distinguish resilience from recovery. *Recovery*, he argued, connotes a trajectory (pattern of change) in which the individual's normal functioning deteriorates, usually for a period of several months, and then gradually returns to pre-event levels. By contrast, *resilience* reflects an ability to maintain a stable equilibrium. Resilient individuals may experience transient perturbations in normal functioning (e.g., restless sleep) but generally exhibit a stable trajectory of healthy functioning after stress (p. 20).

This notion that resilience must be understood as a longitudinal *trajectory* of good functioning has since become a major theme in behavioral science resilience theory and research. The absence of dysfunction at one point in time does not ensure that it was absent previously or will not occur at some later point in time. In fact, Norris and colleagues (2008, p. 130) embedded this observation into their central definition of resilience as "a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance." In this definition, Norris and colleagues carefully did not equate resilience with the outcome, but rather with the process (trajectory) linking resources (adaptive capacities) to outcomes (adaptation).

There are some semantic nuances that must be reckoned with. Whereas Bonanno emphasized psychological *stability* as the foundation of resilience, others have argued that resilience is better characterized as *adaptability* than as stability (Adger, 2000; Klein, Nicholls, & Thomalia, 2003). In other words, resilience is a process of "bouncing back" from harm rather than immunity from harm (Garmezy, 1991; Layne et al., 2007). This image can be traced to its origins in mathematics and physics, where resistance was defined as the force (stress) required to displace a system from equilibrium, whereas resilience was defined as the time required for the system to return to equilibrium once displaced (Bodin & Wiman, 2004). In physics, resilience has little to do with how large the initial displacement is or even how severe the oscillations are but is more precisely the speed with which homeostasis is restored. Applying this analogy to the human stress response, we should use the concept of *resistance* (not resilience) to describe situations where dysfunction is minimal because coping resources have effectively blocked the stressor.

Norris, Tracy, and Galea (2009) elaborated on this theme further by suggesting, as have some others (Layne et al., 2007), that resilience may be best understood and measured as one member of a *set* of possible trajectories that may follow exposure to trauma or severe stress. In addition to *resistance*, *resilience*, and *recovery* trajectories, there are at least three other trajectories of potential interest in research about the consequences of stressful events: *relapsing/remitting*, in which severe distress displays a cyclical course; *delayed dysfunction*, in which post-traumatic stress disorder (PTSD) or some other trauma-related disorder emerges after considerable time has passed; and *chronic dysfunction*, where an initial stress reaction persists. Despite recent advances, cross-sectional studies still make up the vast majority of research on the consequences of major events and generally cannot distinguish these trajectories from one another. At minimum, three waves of data are required to draw inferences about the full range of potential postevent trajectories.

Lepore and Revenson (2006) presented a somewhat different perspective on the theme of post-event trajectories. Resilience, in their view, can take any of three forms: resistance, recovery, or reconfiguration. They characterized resistance as being like the tree that stands still, undisturbed, in the face of the wind. Resistant people exhibit normal functioning before, during, and after the stressor occurs. They characterized recovery as being like the tree that bends to accommodate the wind. The stressor disrupts the person's normal state of functioning, but when the stressor passes, the person resumes his or her normal or pre-stressor level of functioning. They viewed this process as a continuum, and while the sooner recovery occurs the better, persons who are slow to recover are still resilient relative to those who do not recover at all. Lepore and Revenson then added *reconfiguration* to the mix: in this case, the tree does not simply make temporary accommodations and then resume its original shape; instead, it changes its shape. Likewise, individuals may reconfigure their beliefs and behaviors in a manner that allows them to adapt. "Post-traumatic growth" is one example of such a transformation.

Distinctions between various post-event symptom trajectories are important to consider because it is possible that resistance, resilience, and recovery have different determinants and are best promoted by different intervention strategies introduced at different times (Layne et al., 2007; Norris et al., 2009). I will revisit this point in Section 4. Nonetheless, for most of this review, resistance and resilience will be considered together as optimal patterns of change in the context of stressful events.

1.2 Psychological Manifestations of Resilience

What is the end result of resilience? Adaptation is the theoretical result, but how is it manifested? There is not yet a consensus on this point in behavioral science. In developmental psychology (Masten & Obradovic, 2008), resilience encompasses three distinct phenomena: (1) achieving better than expected outcomes given risk; (2) sustaining competence/ functioning under adverse conditions; and (3) regaining normal functioning following a period of exposure to trauma or adversity. In the mental health arena, researchers have variously proposed that the appropriate individual outcome is minimal impairment of functioning despite distress, rapid recovery from distress, no distress at all, and adversial growth (Bonanno, 2005; Linley & Joseph, 2005; Litz, 2005). In practice, resilience often has been operationalized as the absence of psychopathology, which is highly inadequate (Layne et al., 2007; Rutter, 1993). A strict focus on prevalence of disorders may cause us to erroneously or prematurely conclude that a community has recovered from an event when there is still considerable distress, dysfunction, or dissatisfaction present, and it dismisses the adverse consequences of suffering that does not qualify for strict definitions of pathology (Norris et al., 2008).

Norris et al. (2008) suggested that "wellness" is a viable indicator that adaptation has occurred on the individual level. They based this conclusion largely on the writings of Emory Cowen (1994; 2000), who contended that psychological wellness provides a broad and integrative frame for psychological questions and activities, including those related to primary prevention, empowerment, and resilience. By arguing that "wellness must be a matter of prime concern at all times, not just when it fails," Cowen (2000, p. 80) aimed to move psychology beyond a focus on repairing dysfunction to a prime focus on promoting wellness. Norris and colleagues defined psychological wellness according to four criteria: (1) absence of psychopathology; (2) healthy patterns of behavior; (3) adequate role functioning at home, school, and/ or work; and (4) high quality of life. Quality of life captures how people generally feel about their lives as a whole and in domains of work, family life, health, leisure, and

neighborhood (e.g., Zautra & Bachrach, 2000). This definition of wellness is not identical to Cowen's (2000, p. 83) but consistent with it, as well as with areas of concern for public health and behavioral health policies and programs. A criterion of wellness serves to remind us that we must attend to disaster victims' abundant problems in living that may interfere with their quality of life (Norris et al., 2002a; 2002b). In making their recommendations for future research, Layne and colleagues (2007) argued that we must approach resilience and other post-event trajectories as domain-specific phenomena. As this recommendation suggests, one might observe resilience in one domain of wellness (e.g., psychopathology) but not necessarily in another (e.g., quality of life).

The criterion of wellness can be extended from the individual to the community level without difficulty. Although a community is not merely the sum total (or average) of its members, community-level adaptation can be understood as "population wellness," a high prevalence of wellness in the community, defined as high and non-disparate levels of mental and behavioral health, role functioning, and quality of life in constituent populations. If emergency management systems function effectively to protect lives, reduce injuries, minimize damage to public utilities, and connect community members to necessary services, it is reasonable to expect the population to remain well. Wellness levels in the community can and should be monitored in post-disaster needs assessment and surveillance initiatives to guide resource allocation.

1.3 Prevalence of Resilience

As Bonanno (2004, p. 23) noted in the second key point of his article, available research suggests that resilience is not rare but is actually quite common. One of the precursors of the recent explosion of interest in adult resilience was the finding across several large-scale epidemiologic investigations (Breslau et al., 1998; Kessler et al., 1995; Norris, 1992) that rates of posttraumatic stress disorder (PTSD) in the general population were dramatically lower than rates of exposure to potentially traumatic events. Depending on the range of events assessed, these and similar studies found that from 50% to 90% of the U.S. population had experienced an event that might be considered traumatic, such as a physical or sexual assault, an injury-causing accident, or the sudden unexpected death of a loved one. In the Detroit Area Survey (Breslau et al., 1998), one of the strongest studies methodologically, the conditional risk of PTSD (the prevalence of PTSD given exposure) was 18% in women and 10% in men when estimated on the basis of the respondent's worst event. In other words, more than four out of five trauma-exposed people *never* develop PTSD, although they usually do experience some symptoms of distress. PTSD takes a chronic course in about one-third of the persons who develop it (Kessler et al., 1995).

Longitudinal studies examining particular stressors and populations have provided further evidence that resilience and resistance are common rather than rare. For example, Orcutt, Erikson, and Wolfe (2004) studied a predominantly male sample of Gulf War veterans within 5 days of their return to the United States and approximately 2 and 6 years later. Two distinct growth curves characterized the data. The largest group of veterans showed low levels of PTSD symptoms initially and little change. The other group showed slightly higher symptoms initially, followed by significant increases over time. These trends would be most consistent with the resistance and delayed dysfunction trajectories defined by Norris et al. (2009), but the long intervals may have made it difficult to capture other potential patterns. O'Donnell, Elliott, Lau, and Creamer (2007) studied a predominantly male sample of injury survivors assessed prior to hospital discharge and 3 and 12 months post-event. Patterns in their data also pointed

to a larger resistant subgroup (these persons were low in PTSD symptoms at all time points) and a smaller subgroup with chronic dysfunction (these persons had higher levels of symptoms initially and grew more symptomatic over time). Ott, Lueger, Kelber, and Prigerson (2007) cluster analyzed longitudinal data (collected on average at 4, 9 and 18 months post-event) from a predominantly female sample of older bereaved spouses. The largest group of participants followed a recovery trajectory by being high in symptoms at Time 1 and then showing slow, steady improvements. The second largest group followed a resilient trajectory, and the third and smallest group showed chronic dysfunction.

Resistance or resilience was clearly exhibited by the older adults studied by Bonanno, Wortman, and Neese (2004). The investigators tracked depressive symptoms in 185 older adults beginning on average 3 years prior to death of spouse (bereavement) and again 6 and 18 months after their spouse's death. Nearly half of the sample (46%) showed low levels of depression at all three time-points (before bereavement and 6 and 18 months after). Only 11% showed a marked increase in depression 6 months after the death followed by a subsequent return to normal at 18 months (the expected "typical" grief pattern), and only 16% showed a substantial increase in depression at 6 months that remained elevated at 18 months (chronic, unrelenting grief). The majority of study participants did experience some yearning and emotional pangs, but these feelings were transient and interfered relatively little with day-to-day functioning.

In interpreting these findings, it should be noted that Bonanno et al. defined change in depression conservatively as more than one standard deviation (*SD*) on the psychological measure. In most studies, one *SD* would be characterized as a large change. With this point in mind, their findings are interesting to contrast to those of Hobfoll et al. (2009). Hobfoll and colleagues examined trajectories of distress during ongoing terrorism among 709 Jews and Arabs in Israel, longitudinally, 1 year apart. These investigators defined "distress" somewhat liberally as the presence of more than one symptom of traumatic stress or depression at the time of assessment. Longitudinally, 22% of participants were classified as showing resistance (distressed at neither time-point), 14% as showing resilience (distressed at Time 1 but not Time 2), 54% as showing chronic distress (distressed at both time-points), and 10% as showing delayed distress (distressed at Time 2 but not Time 1). Are the dramatic differences between Hobfoll's and Bonanno's findings the result of differences in events, populations, or method? These differences cannot be disentangled when results depend upon investigator-derived and inconsistent definitions. Moreover, the second study also raises the issue of whether the resilience concept even applies when the threat of exposure to violence persists.

Norris et al.'s (2009) trajectory analysis is especially relevant to this review, and thus will be described in some detail. Group-based modeling procedures were used to identify various trajectories of distress in the aftermath of two very different disasters: the 1999 flood and mudslides in Villahermosa and Teziutlán (Mexico) and the 2001 terrorist attacks in New York City. This study afforded several advantages relative to prior research. First, each study had four-wave longitudinal designs that allowed the full range of potential trajectories to be identified. Second, both the Mexico and New York studies were population based. Most previous studies on this topic had focused exclusively on selected groups, such as male combat veterans, hospitalized injury survivors, or older bereaved spouses. Third, although the studies lacked predisaster measures, the measures of post-traumatic stress were event specific and thus overcame the problem to the extent possible. Although posttraumatic stress (more precisely, the lack thereof) is incomplete as a manifestation of resilience, it has useful properties for research because of its hypothetical zero-point before the event. Finally, replication of the models across disaster types and settings increases confidence in the generalizability of results.

Even though both disasters were quite serious, from one-third (Mexico) to one-half (New York) of participants exhibited *resistance* by never showing more than mild distress, operationally defined as ≤ 3 event-related symptoms (17 specific symptoms were measured in each sample at each time point). Although the authors characterized this trajectory as resistance, it is similar to the definition of resilience provided by Bonanno (2004). The prevalence of *resilience* was 32% in Mexico and 10% in New York. The resilient groups never showed severe distress but rather began with moderate distress, rapidly improved to mild distress, and subsequently showed no distress. The prevalence of *recovery* in Mexico was 11%; this group improved from severe to moderate distress during the course of the study, which concluded at 2 years post-disaster; extrapolation of the recovery trajectory indicates that it might take another year or two (i.e., until 3–4 years post-disaster) for this group to reach the mild levels of distress experienced by the resistant and resilient groups at 2 years post. The prevalence of recovery in NY (9%) was about the same as in Mexico, and most of this group's improvement took place between 2 and 3.5 years post. *Chronic dysfunction* trajectories were evident in both Mexico (22%) and New York (13%), but *delayed dysfunction* was observed only in New York (14%).

If one does some additional "lumping" to reduce detail, the findings from Mexico and New York are impressively similar: In Mexico and New York, respectively, 67% and 64% showed resistance or resilience (the two most desirable patterns), 11% and 9% showed recovery, and 22% and 27% showed chronic or delayed dysfunction. On the basis of these results, it might be reasonable to propose a "7:1:2" expectation for general populations post-disaster: just under 70% of adults will show resistance or resilience; 10% will recover, but more slowly; and 20% will show more enduring problems.

1.4 Sources of Resilience

In his 2004 article, Bonanno's third and final key point was that there are multiple and sometimes unexpected pathways to resilience. This statement succinctly summarized a wealth of research examining the influence of risk and protective factors in the context of stress. As he stated, there is truly no single way of maintaining equilibrium.

Developmental psychologists have been particularly influential in calling attention to the diverse ways that children may overcome adversity to develop and function appropriately, beginning with the seminal research of Werner and Smith (1982). Developmental researchers who have followed the lives of at-risk children have observed everything from serious mental illness to remarkable success in adulthood. Recently, Masten and Obradovic (2008) reviewed the research on resilience in human development with the aim of informing plans for disaster response and recovery. They noted that resilience arises from interactions across multiple domains of life, and outlined the adaptive systems that are believed to be most important for human resilience. Their list provided an excellent outline, so I have followed it here, adding additional relevant concepts and commentary along the way. This list of base resources sets the stage for the themes that are developed more fully in Sections 2 and 3 of this review.

1.4.1 Attachments and Social Relationships

Relationships provide the foundation for resilience. For young children, the potential for resilience depends primarily on the quality of early relationships with parent figures. Later, friends and romantic partners provide this base of security. All planning for disaster must account for the attachment system and how such relationships are likely to motivate behavior and provide a sense of security (Masten & Obradovic, 2008).

A substantial body of research has developed regarding the influence of social support on individuals' ability to cope with and recover from significant sources of stress (Brewin, Andrews, & Valentine, 2000; Taylor & Stanton, 2007) including disasters and terrorist attacks (Norris et al., 2002b). In addition, it has been argued that Social Capital, defined as the aggregate of the actual or potential resources linked to the possession of a durable network of relationships (Bourdieu, 1985), is one of the four essential adaptive capacities that create community resilience (Norris et al., 2008). The mechanisms by which social support plays its protective role are more complex than often recognized because social relationships can themselves be damaged by disasters. This work is reviewed in Section 3 (Response and Recovery).

1.4.2 Agency

"Agency" is an umbrella term for the various ways in which people exert personal control over their lives, futures, events, and environments. A behavioral science perspective on resilience must begin and end with the position that individuals are active agents in their own lives. They make plans and behave intentionally to bring about desired outcomes. Human beings do not simply respond passively to rewards and punishments or to larger sociological forces. Humans are motivated to adapt, although motivation can be extinguished by prolonged exposure to unresponsive environments or uncontrollable events. People with positive views of their own efficacy exert more effort to succeed and are more likely to persist in face of adversity. Agency can be achieved either behaviorally or cognitively (Bandura, 1982). Whereas "behavioral control" occurs when people take actions that forestall or modify aversive events, "cognitive control" occurs when people believe they can manage threats, should they arrive. The fundamental importance of cognitive control in contemporary psychology has given rise to several specific theoretical frameworks that differ in their nuances and semantics but share much in common at their core. For an understanding of resilience, three of the most important concepts are *self-efficacy*, *optimism*, and *hope*.

Self-efficacy beliefs are a person's perceived ability to organize and execute courses of action to achieve desired outcomes. The psychologist who has written most extensively about self-efficacy is Albert Bandura. In a particularly influential paper (1982, p. 122), he wrote, "Efficacy in dealing with the environment is not a fixed act or simply a matter of knowing what to do. Rather it involves a generative capability in which component cognitive, social, and behavioral skills must be organized into integrated courses of action to serve innumerable purposes." Self-efficacy has been shown to influence precautionary behavior, as well as how people respond emotionally and behaviorally to stress. These specific functions will be revisited in Sections 2 and 3.

The related concept of optimism has been defined in two ways. First, it is an attributional style of making *external*, *variable*, and *specific* attributions for negative outcomes rather than *internal*, *stable*, and *global* ones (Seligman, 1991). In attribution theory, more broadly, people assess the causes of events on three dimensions. The internality dimension captures whether outcomes are ascribed to internal factors (personal characteristics) or to external factors; the stability dimension captures whether outcomes are ascribed to enduring factors (immutable traits/ characteristics) or transient factors; and the generality factor captures whether the causes are believed to operate in many situations or only a few (Bandura, 1982). Optimists tend to see their failures as due to aspects of the specific situation that are unlikely to be repeated.

Second, optimism refers to generalized expectancies for success (Scheier & Carver, 1985). Optimism has been shown to be a key protective factor for disaster recovery (e.g., Carr et al., 1997; Dougall et al., 2001). However, the role of optimism in influencing risk perception and

precaution adoption is more complex, and it creates challenges for practitioners who seek to increase the public's preparedness for disaster. This theme is explored more fully in Section 2.

Hope subsumes some elements of both self-efficacy and optimism. As a mechanism relevant to understanding resilience, the goal-direction model of Charles Snyder (Feldman & Snyder, 2005; Snyder et al., 2000) is especially relevant. Hope, according to Snyder, has two elements: (1) *pathways* – the perceived capacity to produce routes to goals and (2) *agency* – the thoughts that people have regarding their ability to begin and continue movement on the pathways to their goals. Snyder et al. (2000) argued that prevention is an act of hope, a "positive, empowered view of one's ability to act so as to attain better tomorrows." They noted that interventions need to do more than enhance agentic thinking. They need to provide routes for moving forward (the pathways).

1.4.3 Intelligence, Problem-Solving, Information-Processing, and Self-Regulatory Systems

Masten and Obradovic (2008) observed that better cognitive and problem-solving skills have been implicated in nearly every study comparing adaptive and maladaptive groups of at-risk youth, including Masten's (2001) study of a school sample followed over 20 years. Intelligent behavior rests on healthy brain development and functioning as well as learning processes and experiences. Overcoming adversity often requires individuals to regulate their thoughts, feelings, and behaviors in order to continue functioning. Fear and anxiety can interfere with higher cognitive abilities.

Information processing models have become hugely influential in the field of trauma research and PTSD treatment. These models make clear predictions about how the nature of an individual's initial response to a crisis can influence long-term outcomes. In contemporary behavioral science, the study of regulatory systems for controlling arousal, affect, and attention is usually intertwined with the study of information processing. This theme will be explored in Section 3.

1.4.4 Microsystems, Communities, and Macrosystems

"Microsystems" refer to the families, peer networks, and settings (classrooms, work) in which individuals are embedded. As Masten and Obradovic (2008, p. 9) summarized, "Humans are social, and their adaptive functioning is embedded in a complex array of interdependent relationships and social systems that also serve many regulatory and protective roles." Family routines, rituals, beliefs, narratives, and values work to regulate and protect individuals. The resilience of individuals and families is also linked to the resilience of larger systems. This perspective underlies the growing interest of behavioral scientists in the concept of community resilience (e.g., Norris et al., 2008).

Masten and Obradovic (2008) noted that "macrosystems" (e.g., culture, media) have rarely been incorporated into behavioral studies, but can be assumed to influence the resilience of individuals. However, the influence of media has become a topic of some controversy with regards to understanding the impact of terrorism and disasters on persons who are not directly harmed. There is ample evidence (e.g., Ahern et al., 2002; Bernstein et al., 2007; Lau, Lau, Kim, & Tsui, 2006; Silver et al., 2002) that post-disaster symptoms are positively correlated with exposure to extreme media images (e.g., people jumping from the towers on 9/ 11/ 2001; dead bodies in the aftermath of the 2004 tsunami; the iconic dead child in footage of the Oklahoma City bombing). What these relations mean is not yet clear, and investigators generally caution

against attributing causality. Marshall and colleagues (2007) proposed that media effects are explained by "relative risk appraisals" that mediate the relation between an event and its meaning. This point will be revisited in Section 2 of this review.

1.5 Conservation of Resources for Resilience

Masten's list could be characterized as a menu of resources that combine and interact to create multiple pathways to resilience. Borrowing Hobfoll's (1989) definition of resources, Norris et al. (2008, p. 134) likewise concluded that resilience "depends on a host of objects, conditions, characteristics, and energies that people value – that is, resources." They also argued, however, that pre-event resources must possess one or more dynamic attributes in order to engender resilience. Drawing upon the earlier work of Bruneau et al. (2003), they characterized these dynamic attributes as *robustness*, the ability of the resource to withstand stress without suffering degradation; *redundancy*, the extent to which elements are substitutable in the event of disruption or degradation; and *rapidity*, the speed with which the resource can be accessed and used. By highlighting the necessity of these attributes, Norris and colleagues aimed to integrate resilience perspectives with evidence showing that resources are not static – they evolve, strengthen, weaken, and rebound – and these trajectories are of interest in their own right (Hobfoll, 1989).

This is important because resilience can fail when the necessary resources are themselves damaged or disrupted by the stressor. The concept of resource loss has become central in stress theory, primarily because of the influence of Hobfoll's (1989, 1998) theory of "conservation of resources" (COR). The basic tenet of COR theory is that individuals strive to obtain, retain, protect, and foster those things that they value, which are termed resources. In Hobfoll's theory, stress occurs when resources are threatened, when resources are lost, or when individuals fail to gain resources following a significant investment of other resources. COR theory has become highly influential in disaster research because disasters and terrorism threaten a host of object resources (housing), personal resources (optimism, safety), social resources (companionship), and energies (money, free time). This phenomenon wherein resources are themselves harmed by the stressors they are presumed to buffer severely limits the protection resources can afford.

In recent work, Hobfoll and colleagues (in press) have aimed to more explicitly apply COR theory to explain human resilience. In particular, they highlighted the principle of *resource investment* – people must invest resources in order to protect against resource loss, recover from losses, and gain resources. Persons with greater resources are therefore less vulnerable to resource loss and more capable of generating gain. They characterized resilience as an active process that demands the investment of personal and social resources. Hobfoll and colleagues also posited that, although resource loss is more potent than resource gain, the salience of gain increases under conditions of resource loss. Under conditions of high loss (such as in the aftermath of disasters), efforts that result in even small gains can elicit hope and lead to further goal-directed efforts. Additionally, Hobfoll and colleagues described the potential for resource loss and gain spirals: Initial loss begets future loss. As they noted, secondary stressors after traumatic events continue to tax personal resources, and thus the demand on resources continues until resources can be gained and loss halted. Efforts to enhance resource gain cycles and to minimize resource loss cycles should facilitate human resilience. Resource loss/ gain is a crucial theme for understanding stress recovery, and one more specific application (the mobilization and deterioration of social support) will be reviewed in Section 3.

2. ANTICIPATION AND REDUCTION OF VULNERABILITIES: HOW INDIVIDUALS PERCEIVE AND REDUCE RISK

According to CARRI, the first characteristic of a resilient community is that it anticipates problems and opportunities, and the second characteristic is that it takes action to reduce vulnerabilities. In Section 2 of this review, I summarize research and theory from behavioral science that is relevant to understanding how individuals anticipate or perceive risk and engage in behaviors design to reduce perceived vulnerabilities.

2.1 Roots of Anticipation: Cognitive Schemas, Assumptions, and Illusions

As it is for community resilience, the ability to anticipate risk is central to individual resilience, although the process is complicated by a host of biases that regulate human thought and emotion. Research on cognitive "schemas" has been among the richest areas of progress in the past few three decades in psychology. By necessity, the works cited in this section represent only a small fraction of the total body of work on human thought.

A schema refers to an abstract knowledge structure that is stored in memory; it is the rich network of information about a given stimulus domain that provides the basis for anticipating the future (Janoff-Bulman, 1989; Taylor & Brown, 1988). It guides what we notice and remember and how we interpret new information. Schemas are strongly held expectations, and biases operate to maintain stability. Because we are conservative about changing schemas, we generally prefer to assimilate rather than accommodate discrepant information. Information processing is full of shortcuts, errors, and self-serving interpretations of data. Largely, these processes are adaptive, but not entirely.

Janoff-Bulman and Frieze (1983) advanced schema theory in stress research by arguing that victims' distress was due to the shattering of the basic assumptions they held about themselves and their world. There are three major sets of assumptions (or schema) that most of us hold. The first is the assumption of invulnerability, the belief that it "can't happen to me." As will be discussed in more detail shortly, people underestimate the likelihood of personally experiencing negative events. The second assumption is of the world as meaningful – events are comprehensible and controllable. This assumption builds on the "just world hypothesis," the notion that "people get what they deserve" (Lerner, 1980). The third assumption is of the self as positive – we tend to view ourselves as worthy, decent people, and have high self-esteem. Coping with trauma is in a large part a process of rebuilding the assumptive world.

In some ways, Janoff-Bulman and Frieze's (1983) contribution set the stage for Taylor and Brown's (1988) article that had widespread influence on the way mental health was understood in the behavioral sciences. Taylor and Brown summarized a wealth of experimental evidence to support their conclusion that mental health may rest more on illusion than reality. They argued that overly positive self-evaluations, exaggerated perceptions of control, and unrealistic optimism are characteristic and adaptive properties of normal human thought. These themes corresponded roughly to the three assumptions (self as positive, world as meaningful, invulnerability) outlined by Janoff-Bulman and Frieze, but Taylor and Brown emphasized that these rosy assumptions were not necessarily rooted in objective fact. For the topic of "Anticipation," an illusion of particular relevance is unrealistic optimism. People typically believe that the future will be better than the present. This perspective is good for mental health, but unrealistic optimism may lead people to ignore legitimate risks in their environment. Janoff-Bulman and Frieze (1983) likewise noted that the assumption of invulnerability can be maladaptive if it keeps people from engaging in precautionary behaviors.

2.2 Optimistic Bias

The concept of unrealistic optimism can be more specifically understood and measured as "optimistic bias." Optimistic bias (also known as comparative optimism) is the tendency to see others as more vulnerable to risk than oneself. Optimistic bias has been a rich area for research since Weinstein (1980) first introduced the concept. A recent paper by Harris, Griffin, and Murray (2008) provided an excellent review of this research, and accordingly the rest of this section relies heavily on their exceptionally clear tests of the original tenets of the theory. They conducted their research using sophisticated multi-level modeling over seven samples.

First, they tested the fundamental question of whether people do, in fact, believe that negative events are less likely to happen to them than to other people. This hypothesis was supported. Averaged across all samples, for an event that is average in frequency, average in controllability, and average in severity, the expected self-risk rating was 4.3 on a 10 point scale, the expected other-risk rating was 5.2, and the difference was 0.9 – a substantial and significant overall optimistic bias.

Second, they tested whether optimistic bias (measured by the difference between self-risk ratings and other-risk ratings) was confined to only particular types of events. While bias was less pronounced with higher frequency events than with lower frequency events, it was eliminated only for extremely common events. It was influenced little by the relative undesirability of events; that is, the bias held across most events.

Third, they tested whether optimistic bias was confined to only particular types of people. Weinstein had proposed that individuals with high self-esteem would show *lower* self-risk ratings and thus *more* optimistic bias. This was supported; however, the bias was not unique to high-esteem individuals. Conversely, individuals with high trait anxiety were hypothesized to show *higher* self-risk ratings and thus *less* optimistic bias. In accord, anxiety was positively and significantly related to self-risk, but the findings also suggested that only very extremely anxious individuals would show an absence of comparative optimism.

Fourth, Weinstein proposed that the perceived controllability of events would influence the extent of optimistic bias. This was also strongly supported by the findings: the greater the perceived controllability of a negative event, the greater the tendency for people to believe that their own chances of experiencing the event were less than those of the average person.

In summary, Harris et al. (2008, p. 1235) found evidence for a "robust optimistic bias." The bias was strongest for controllable events and rare events, and for individuals with particularly high self-esteem or low trait anxiety, but it was limited neither to particular types of events nor to particular types of persons.

2.3 Risk Perception

Optimistic bias is one facet of the larger construct of risk perception. Summarizing many years of thought and research on risk perception, Paul Slovic and colleagues (2004) discussed two fundamental ways in which human beings comprehend risk: the "analytic system" is rule based, slow, and effortful; the "experiential system" is intuitive, fast, relatively automatic, and the most natural and common way to respond to risk. The latter relies on images and associations, linked by experience to positive or negative effect. Slovic et al. strongly disputed the notion that affective responses are irrational. Rather, they argued, analytic and experiential systems work in parallel and depend on each other for guidance.

Feelings (emotions, affect) that become salient in the process of judging risk depend on both the individual and situation. Affective impressions of the context can be easier and more

efficient than weighing all of the pros and cons and retrieving relevant examples from memory. Affect, in a sense, becomes a mental shortcut, sometimes referred to as a "heuristic" in this field. Support for an "affect heuristic" comes from a diverse set of studies, a few of which were reviewed by Slovic et al. (2004). In particular, feelings of dread or outrage, which are associated with the voluntariness, lethality, controllability, and fairness of events and threats, strongly influence public perception and acceptance of risk for a wide range of hazards. The risk associated with dreaded events (those associated with strong feelings, such as nuclear accidents) is unacceptable even if the likelihood of their occurrence is remote.

Marshall and colleagues (2007) speculated on the role of risk perceptions and affect heuristics in explaining the far-reaching consequences of terrorist attacks, such as the September 11, 2001, attacks on the World Trade Center. Their goal was to explain why PTSD symptoms related to 9-11 occurred in large numbers of individuals who did not fit traditional definitions of exposure, and they argued that relative risk appraisals provided the missing psychological link. Basing their thinking in part on the work of Slovic (e.g., Slovic et al., 2004), Marshall and colleagues coined the term "relative risk appraisal" because it emphasizes the comparative process through which an environmental event is appraised in relation to prior experiences and risk expectations, including standards for acceptable risk (thus the qualifying term, relative). Moreover, terrorist attacks would activate affect heuristics associated with dreaded events because they are uncontrollable and engender risks that are not fully visible or known. The authors argued that 9-11 carried high "signal potential," which is a warning that a new ongoing threat has entered the environment. High impact events with high negative signal potential may be the exceptional events that can produce PTSD and other adverse mental health consequences even in persons who were not directly exposed. In a sense, returning to the original theme of this section, these events are emotionally powerful enough to shatter the perceptions of invulnerability and unrealistic optimism that otherwise pervade human thought about risk.

2.4 From Risk Perception to Action: the Precaution Adoption Process

Of course, an important question – and one that has been of interest in both psychology and public health – is the extent to which risk perceptions influence preventive behavior. A good example of survey research on this topic was Brewer et al.'s (2004) tests of the relations between perceived risk and behavior over time in the context of Lyme disease. Because an understanding of the attitude–behavior relation is central to CARRI's themes of anticipation and reduction of vulnerabilities, I have reproduced the figure used by the authors to outline the hypothesized effects over time (Figure 1).

Brewer et al. argued that it was important to clarify the distinctions between three "easily confused hypotheses." The *behavior motivation hypothesis* is that perceptions of risk cause people to take protective action; the *risk reappraisal hypothesis* states that when people take actions thought to be effective, they lower their risk perceptions; and the *accuracy hypothesis* is that risk perceptions accurately reflect risk behavior. These relationships cannot be disentangled in cross-sectional data and must be tested longitudinally. All three hypotheses were supported: Participants with higher initial risk perceptions were much more likely than others to get vaccinated against Lyme disease over the next few months; being vaccinated led to reduction in risk perception; and people who got vaccinated correctly believed that their risk of future infection was lower than that of people not vaccinated.

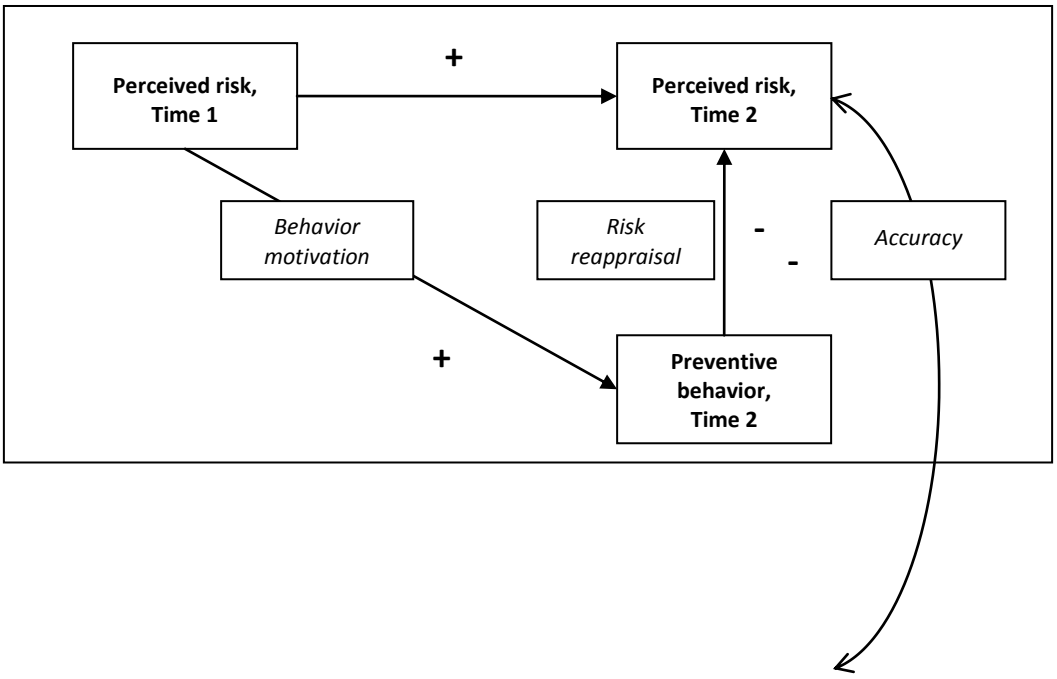

Figure 1. Relationship between perceived risk and behavior over time. Variables are in bold font; processes are in italics; the sign (+/ -) is the direction (positive, negative) of the observed correlation. With kind permission from Springer Science+Business Media: *Annals of Behavioral Medicine,* "Risk perceptions and their relation to risk behavior," vol. 27, 2004, p. 126, N. Brewer, N. Weinstein, C. Cuite, and J. Herrington.

2.5 Other Psychological Influences on Precautionary Behavior

The relatively recent example of Brewer et al.'s research illustrates themes that have been prominent in the prevention literature for some time, but there are numerous other factors that have been proposed or found to be related to precaution adoption. That is, perceived risk is one factor, but only one factor that influences behavior (perhaps it is necessary, but not sufficient).

One of the earliest and best known researchers in this area was Ronald Rogers (e.g., Maddux & Rogers, 1983), a social psychologist whose work focused on fear appeals, persuasion, and attitude change. Fear appeals work to increase threat, thereby increasing protection motivation. The 1983 article by Maddux and Rogers, a classic work in this field, revised Rogers' original theory of protection motivation by incorporating self-efficacy into the predictive models. Influenced by Bandura's views that were introduced in Section 1 of this report, Maddux and Rogers argued that all processes of psychological change should operate through alteration of an individual's expectancies of personal mastery or efficacy. Using a factorial laboratory experiment, Maddux and Rogers investigated the effects of *threat* (a manipulation of the probability of the threat's occurrence) together with the effects of *coping response efficacy* (a manipulation of the effectiveness of the recommended coping response), and *self-efficacy* (a manipulation regarding the relative ease or difficulty involved in the coping response) on intentions to adopt a recommended preventive behavior. One example might help to clarify the conditions: cigarette smoking is likely or unlikely to lead to heart disease (threat); cessation of smoking now is likely or unlikely to un-do the damage and reduce risk (coping response efficacy); and quitting smoking is easy or difficult to do (self-efficacy).

The findings were instructive. First, the probability of the threat's occurrence and the effectiveness of a coping response both had main effects on intentions to adopt a recommended preventive behavior. Self-efficacy had both main and interactive effects on intentions. In fact, self-efficacy was the single most powerful predictor of behavioral intentions. The important point here is that messages designed to encourage precautions cannot focus solely on threats. Fear alone may have minimal effect on behavior unless individuals are also informed about specific actions that can be taken to reduce the threat and are given reason to believe they have the ability to perform the action. This fundamental principle from behavioral science is violated when warnings have no counterpart in how individuals are expected to behave.

Roger's protection motivation theory is only one of several prominent theories of precaution adoption. Neil Weinstein (1993) compared and contrasted four competing theories: the health belief model, the theory of reasoned action (revised as the theory of planned behavior), protection motivation theory, and subjective expected utility theory. Although the focus was on health behavior, conceptually there is much overlap between health behavior, hazard preparedness, and other self-protective behaviors (Norris, 1997). The nuances that differentiate the theories, for example, their combinatorial rules, are important for investigators undertaking research on precautions, but for the purposes of this report, a simpler outline of predictors should suffice. As discussed by Weinstein (1993, pp. 325-6) in the first section of his paper, the primary variables, found in most theories, are these:

- *Perceived severity* – the individual's evaluation of the undesirability of a particular outcome assuming no change in behavior; in different theories, this concept has been labeled perceived severity, negative utility, and negative evaluation, but the underlying meanings of these terms are the same.
- *Perceived probability* – the perceived likelihood that a particular negative outcome will occur; this factor is variously referred to as perceived vulnerability, perceived susceptibility, subjective probability, and expectancy in different theories.
- *Perceived effect* – the perceived effectiveness of the precaution; essentially, the expected benefit is the difference between (a) beliefs about the severity and probability of an outcome assuming no change in behavior and (b) beliefs about the severity and probability of an outcome assuming the adoption of a protective measure.
- *Expected cost* – the expected costs of adopting the precaution, including time, effort, money, inconvenience, and loss of satisfactions obtained from the current behavior.
- *Self-efficacy* – the person's perceived ability to perform the behavior, that is, the ease or difficulty of the action; this factor is emphasized most strongly in protection motivation theory, as was discussed above, but the concept is implicit in most theories within the category of costs/ barriers to behavioral change.
- *Social influence* – the extent to which other people in the individual's social circle want him or her to perform a given behavior (normative beliefs) in combination with the individual's motivation to comply with each of their preferences; this factor is unique to the theory of reasoned action, which may be one of the strengths of that theory.

None of the models predicts amount of behavior but rather its likelihood. Also, in research, the focus is often on predicting behavioral *intentions* rather than behavior per se.

2.6 Reducing Vulnerability through Collective Action

Community resilience depends not only on individuals' motivations to protect themselves but also on their motivations to protect their communities. Thus, I searched for behavioral science research that might elucidate the factors that lead individuals to participate in collective action to reduce vulnerabilities or disadvantages. I was fortunate to find a recent meta-analysis published in *Psychological Bulletin* (the highest ranking journal for such analyses) by van Zomeren, Postmes, and Spears (2008). This was an amazingly rich article for any reader with interest in this topic; all of the research summarized in this section on collective action was drawn from this paper, to which the reader is referred for original citations and a comprehensive reference list.

Van Zomeren and colleagues described the key challenge for their meta-analysis as one of bridging subjective (psychological) and social (structural) perspectives on when, why, and how people engage in social protest. They aimed to integrate three perspectives that focus on *subjective injustice*, *efficacy*, and *identity* as the primary predictors of collective action.

P*erceived injustice* refers to individuals' subjective experience of unjust disadvantage. According to relative deprivation theory, it is only when social comparisons result in a *subjective* sense of injustice that collective action to redress injustice is likely to occur. Group-based emotions, such as anger, often intervene. The meta-analysis examined (a) whether people's subjective experience of injustice in terms of group-based inequality or deprivation predicts collective action and (b) whether the affective experience of injustice produces stronger effects than non-affective perception of injustice. Both predictions held across studies in the meta-analysis.

Efficacy reflects the idea being that people engage in collective action if they believe this will make it more likely that relevant goals are achieved. Efficacy emerged as a significant predictor across studies in the meta-analysis, but it was more important for predicting behavior related to "incidental disadvantages" (e.g., protesting the building of a plant in one's neighborhood) than for "structural disadvantages" (e.g., discrimination). Incidental disadvantages revolve around issue-based or situation-based disadvantages, and may be the most appropriate research to consider for understanding how individuals may become involved in actions to boost their community's resilience to hazards.

The third factor explored by the authors was *identity*. According to social identity theory, people strive for and benefit from positive social identities associated with group memberships, and social identity serves to mobilize people for social change. When members of a lower status group perceive their status differential to be illegitimate and unstable, they are more likely to identify with the group and to engage in collective action to change their intergroup status differential. In the meta-analysis performed by the authors, politicized identities, such as those associated with social movement organizations, were more strongly linked to collective action than were non-politicized social identities. Nevertheless, non-politicized identities still predicted substantial variance in outcome measures, suggesting that social identity in general predicts collective action.

Van Zomeren et al. (2008) proposed a new model, the "integrative social identity model of collective action" (SIMCA), that accounts for relations between the three predictors as well as for their effects on collective action. In SIMCA (p. 511), social identity is the most fundamental precursor of collective action because it has both direct and indirect effects on action. This is illustrated in Figure 2, reproduced from their paper (Figure 2, p. 521) but modified to emphasize the distinction between direct and indirect effects. Identity influences perceived injustice because it provides the basis for a group-based experience of injustice. It influences efficacy

because a stronger sense of identity empowers individuals to act. In the subset of studies that had all relevant measures, the SIMCA model provided the best fit to the data. Van Zomeren and colleagues concluded that social identity is "at the very heart of explanations of collective action."

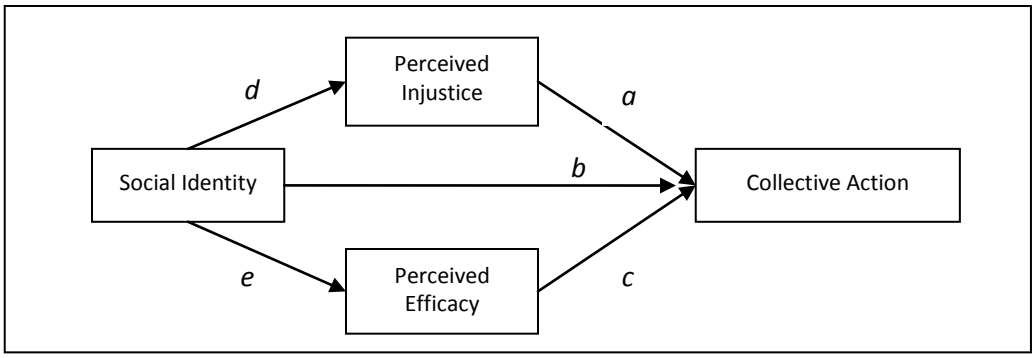

Figure 2. The direct effects of injustice, identity, and efficacy (paths *a*, *b*, and *c*) on collective action; identity also has indirect effects through injustice (*d*a*) and efficacy (*e*c*). Copyright 2008 by the American Psychological Association. Reproduced with permission. M. Van Zomeren, T. Postmes, and R. Spears (2008, p. 521). "Toward an integrative social identity model of collective action: A quantitative research synthesis of three socio-psychological perspectives," *Psychological Bulletin*, vol. 134, July 2008. DOI:10.1037/ 0033-2909.134.4.504. The use of APA information does not imply endorsement by APA.

The centrality of identity in SIMCA suggests that *sense of community* and *place attachment*, two primary foci of research in community and environmental psychology, are potentially relevant for understanding collective action to reduce vulnerabilities. Norris et al. (2008) discussed these two concepts as central elements of Social Capital, one of the four adaptive capacities required for community resilience. Sense of community is an attitude of bonding (trust and belonging) with other members of one's group or locale (Perkins et al., 2002, p. 37). Individuals who possess a strong sense of community tend to show concern for community issues, respect for and service to others, and a deep sense of connection. Place attachment is closely related to one's sense of community. It implies an emotional connection to one's neighborhood or city, somewhat apart from connections to the specific people who live there. Brown and Perkins (1992) argued that place attachments are integral to self-definitions; these attachments are holistic and multi-faceted and provide stability. Place attachment often underlies citizens' efforts to revitalize a community (Perkins et al., 2002) and thus may be especially relevant when community members perceive incidental disadvantages that require action.

2.7 Closing Note for Section 2

In closing Section 2 of this behavioral science review with a model of *collective* behavior, I should be clear that collective action ultimately rests on the perceptions, motivation, and behavior of individuals who see themselves as agents for change in their community. This is one concept that illustrates the transactional nature of individual and community resilience. In the Norris et al. (2008) model of community resilience (p. 136), collective action was a key element of Community Competence, one of the four adaptive capacities required for community resilience. We now see that collective action rests heavily on individual perceptions

of injustice, efficacy, and identity. As Norris et al. noted, residents of endangered communities must be able to learn about their risks and options and work together flexibly and creatively to solve problems. The inclusion of Community Competence in the community resilience model reflects behavioral science's fundamental concern with agency, mastery, and control (see also Brown & Kulig, 1996). As evidenced in concepts such as self-efficacy and optimistic bias, human agency has pervaded behavioral science research and theory related to CARRI's themes of anticipation and reduction of vulnerabilities. If I were to summarize Section 2 in a single sentence, it would be that an individual's capacity for meaningful, intentional action is what underlies his or her potential to anticipate problems and opportunities and to transform his or her environment to reduce vulnerabilities.

3. RESPONSE AND RECOVERY: HOW INDIVIDUALS REACT TO, COPE WITH, AND RECOVER FROM STRESSFUL EVENTS

In Section 2, I reviewed research and theory from behavioral science relevant to understanding CARRI's first two characteristics of a resilient community: (1) It anticipates problems and opportunities and (2) takes action to reduce vulnerabilities. In this section, I review research and theory from behavioral science relevant to understanding the remaining two characteristics: (3) It responds effectively and (4) recovers rapidly. Stress response and recovery has been a huge topic of research in the behavioral sciences for about 40 years, and much has been learned about how individuals respond to and recover from stressors of various kinds, including disasters and terrorist attacks.

3.1 Overview of the Stress Process

Models of the stress process typically consider (a) characteristics of the stressor, (b) appraisals of the stressor, (c) the response to or effects of the stressor, and (d) various conditions that influence the relations between the stressor, stress appraisal, and stress response. In stress-diathesis theory, level of exposure is proposed to interact with preexisting vulnerabilities to influence the stress response. The influence of this theory is evident in some of the earliest published frameworks for disaster research (see Benight, McFarlane, & Norris, 2006, for further discussion of these points). As an example, Norris et al.'s (2008) model of stress resistance and resilience is provided in Figure 3. This model owes its fundamental structure to Barbara Dohrenwend's (1978) early model of psychosocial stress. I will revisit her model in Section 4 because it was a forward-thinking attempt to relate the stress process to different points and types of intervention. Like most models of the stress process, Norris et al. emphasizes *interactions* between the stressor and resources. Resistance occurs when resources are sufficiently strong (robust, redundant, or rapid) to buffer or counteract the immediate effects of the stressor such that no dysfunction occurs. Resilience occurs when resources are sufficiently strong to buffer or counteract the effects of the stressor such that a return to functioning occurs. Vulnerability occurs when resources are not sufficiently strong to create resistance or resilience, resulting in persistent dysfunction. The more severe, enduring, and surprising the stressor, the stronger the resources must be to create resistance or resilience.

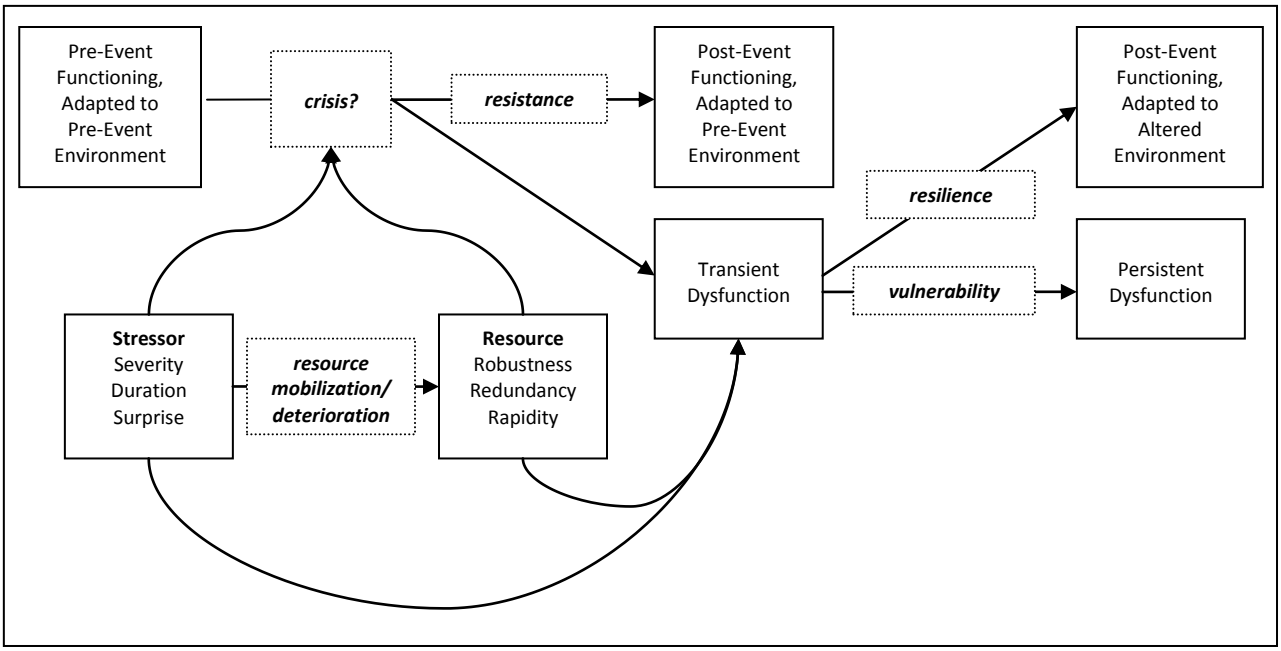

Figure 3. Model of stress resistance and resilience. *Source*: Norris et al. (2008, p. 130).

The process begins when a stressor, such as a disaster, occurs. Stressors are aversive circumstances that threaten well-being or functioning. Stressors vary on a number of dimensions, including severity, duration, and surprise. Severity of exposure is a consistent risk factor for adverse psychosocial consequences in the aftermath of disasters (Norris et al., 2002a; 2002b). Specific stressors that have been found to affect post-disaster well-being include bereavement, injury to self or family member, life threat, property damage, financial loss, community destruction, and displacement. Objectively defined stressors are modified by stress appraisals and related cognitions, coping responses, and social support. It is somewhat artificial to separate these topics into "response" and "recovery" because appraisals, coping, and social support all occur continuously, over time, from the first moments of an event until its effects have dissipated.

3.2 Cognitive Appraisals of Stress

Contemporary understandings of stress owe much to the groundbreaking work of Richard Lazarus and Susan Folkman. Folkman (1984) provided an excellent overview and summary of the key features of Lazarus' cognitive theory of stress (Lazarus & Folkman, 1984). This theory posits two central processes, cognitive appraisal and coping. In this theory, stress was defined as a relationship between person and environment that is *appraised* by the person as taxing or exceeding his or her resources and as endangering his or her well-being. Note that stress is not a property of the person or environment, not a stimulus or response, but a relationship between person and environment. The meaning of an event is determined by an individual's cognitive appraisal.

There are two major forms of appraisals (Folkman, 1984). In a *primary appraisal*, the person evaluates the significance of the transaction with respect to his or her well-being: Is it irrelevant, benign–positive, or stressful? Stressful appraisals include (a) harm/ loss – the injury or damage is already done; (b) threat – the potential for harm/ loss exists; and (c) challenge – there is an

opportunity for growth, mastery, or gain. Which appraisal occurs is determined by an array of person and situation factors, including beliefs (preexisting notions about reality that serve as the perceptual lens), generalized control expectancies, and commitments (what is important, what has meaning). In a *secondary appraisal*, the person evaluates his or her coping resources and options: What can I do? This appraisal is influenced by situational judgments about the possibility of control. (I will return to the topic of "coping" in a subsequent section of Section 3.)

Primary appraisals of an event's meaning are especially relevant for understanding responses to different types of disasters. Some behavioral researchers have argued that in the case of terrorism, the objective, observable experience of an event should be de-emphasized, relative to the subjective, psychological experience of what that event implies for the future, as evidenced in perceptions of threat (Marshall et al., 2007). From this perspective, what the event means to the individual is more important than his or her tangible losses. The recent attention to understanding terrorism is actually not the first time that the disaster field has struggled with exposure definitions and determined that psychological meanings cannot be ignored. For example, the nuclear accident at Three Mile Island (TMI) in 1979 posed similar dilemmas. Although there was an extensive and frightening emergency evacuation, residents experienced no property damages, no injuries, and minimal exposure to radiation. How could this event then be a disaster? What accounted for the chronic stress and psychological distress evident in TMI (e.g., Baum, Gatchel, & Schaeffer, 1983)? Discussions of these consequences often emphasized the long-term uncertainties regarding the nature of the impact, fears that there might be unseen or delayed consequences, and anxieties regarding threat of recurrence (Bolin, 1985). The adverse meanings of disasters are not limited to threat and uncertainty regarding future harm. The long-standing concern about the heightened potential of human-caused disasters (including various failures of technology) to affect mental health arises essentially because of what these events mean to people about the larger society. As Bolin (1985, p. 24) noted, human-caused disasters "represent in the eyes of victims a callousness, carelessness, intentionality, or insensitivity on the part of others" and make the sense of victimization intense. Residents of areas afflicted by technological accidents often bitterly debate the severity of the threat, and antagonisms may yield high levels of anger, alienation, and mistrust (Kaniasty & Norris, 1999).

The process of appraising events begins immediately but continues throughout the stress response and recovery phases. Dalgleish (2004) reviewed contemporary cognitive theories of PTSD (the primary adverse outcome of interest following trauma exposure) that have evolved from the recognition of cognitive appraisals as central to the stress response. He identified four theories that have influence today. The first is *schema theory*, which was discussed here in Section 2. To recap, schema theory (e.g., Janoff-Bulman & Frieze, 1983) emphasizes the basic assumptions people hold. Schemas are strongly held expectations that guide what we notice and remember and how we interpret new information. According to Dalgleish, schema theory has two primary explanatory principles: (1) past experience is the filter through which new experiences are processed; and (2) new material that is sufficiently inconsistent with past experience is disruptive and leads schemas to either assimilate the information or become changed (accommodation). The second theory is actually a set of *associative network theories* that emphasize the connectivity between various mental representations of the world. Disparate pieces of information can activate each other and lead to generation of affect and emotion. For example, Foa, Steketee, and Rothbaum (1989) described a fear network composed of (a) information about the feared object; (b) information about the individual's cognitive, behavioral, and physiological reactions to the feared object; and (c) information that links (connects) these stimulus and response elements together. The third theory, Brewin, Dalgleish,

and Joseph's (1996) *dual representation theory*, emphasizes the role of memory in processing stressors over time. This theory emphasizes the distinctions between (a) verbally accessible memories (VAM) that can be deliberately retrieved and are fully contextualized in autobiographical memory and (b) situationally accessible memories (SAM) that cannot be deliberately accessed and are not contextualized but rather are triggered by stimuli reminiscent of the trauma. If SAM can be made more accessible and integrated into VAM, the person can recover from the event more effectively. The fourth and final theory is Ehlers and Clark's (2000) *cognitive model of PTSD*, in which the notion of current threat is central. PTSD becomes persistent when individuals process the trauma in a way that leads to a sense of current threat rather than a memory of a threat experienced in the past. The initial threat tied to the original trauma is transformed through ongoing appraisal processes and memory representations. Appraisals of ongoing threat lead to fear, the dominant emotion in PTSD.

Ehlers and Clark's (2000) cognitive model of PTSD highlights the continuing role of cognitive appraisals in stress response and recovery. In short, people who develop PTSD after trauma exposure can be distinguished from those who do not by their *excessively negative appraisals of the event, its sequellae, or both*. Ehlers and Clark (2000) nicely illustrated their points in a table (Table 1, p. 322) that showed particular negative appraisals related to the event or its sequellae. A few of these examples are provided as follows:

- Fact that trauma happened: Nowhere is safe.
- Trauma happened to me: I attract disaster.
- Behaviors, emotions during event: I deserved it, I cannot cope with stress.
- Emotional numbing: I'm dead inside, I'll never be able to relate to people again.
- Difficulty concentrating: My brain is damaged, I'll lose my job.
- Other people's positive response: They think I'm too weak to cope on my own.
- Other people's negative response: *Nobody is there for me.*

Thus one's initial appraisal of an event may foretell long-term outcomes (and thus the likelihood of resilience). For example, Ehlers et al. (1998) found that the nature of the emotional response *during* a motor vehicle crash predicted the likelihood that the survivor would *later* develop PTSD. Studies of disasters and terrorist attacks (Norris et al., 2002b) have also found that self-reported panic during the period of impact is a particularly powerful predictor of subsequent adverse mental health consequences, including depression and anxiety, as well as PTSD. Severely negative appraisals (panic, "catastrophizing") prompt dysfunctional cognitions and behaviors that have the short-term aim of reducing distress but have the long-term consequence of creating and maintaining disorder (Foa et al., 1999). According to Ehlers and Clark, the factors that influence cognitive processing during the trauma include characteristics of the trauma, previous experience, intellectual ability (if low, processing is less conceptual), prior beliefs, and state factors, such as alcohol, exertion, and arousal. The authors recommended thinking through how survivors' interactions with police, hospital procedures, medication, and other matters could be modified to lessen the likelihood of problematic appraisals. "Cognitive restructuring" may be a particularly helpful form of PTSD treatment because it challenges inaccurate, unhealthy beliefs and threats.

3.3 Ways of Coping

At the outset, it may be useful to distinguish coping resources from coping processes (Taylor & Stanton, 2007). *Coping resources* are those relatively stable personal characteristics that

protect individuals from stress, for example, optimism, mastery, self-efficacy, self-esteem, and perceived social support. Note the overlap between members of this list and the sources of resilience described in Section 1. One illustrative program of work in this vein – and one that augments previous themes in Section 2 – is a series of studies conducted by Bonanno and colleagues to explore the idea that "self-enhancing biases" may be particularly efficacious under conditions of adversity, a time when threats to the self are prominent. Their interest in this topic stemmed from Taylor and Brown's (1988) thesis regarding illusions and mental health, in which such self-enhancing biases featured prominently. In a study conducted after the civil war in Bosnia (Bonanno, Field, Kovacevic, & Kaltman, 2002), participants who rated themselves more favorably than their peers rated them (self-enhancers) also tended to rate themselves as better adjusted, and these discrepancies also correlated positively with the ratings provided by mental health experts. These findings supported speculations that self-enhancement is adaptive. In a longitudinal study of persons who were in or near the World Trade Center on September 11, 2001 (Bonnano, Rennicke, & Dekel, 2005), average self-enhancement scores were higher in the group of participants who showed little distress over time (defined as resilience in this study) than in groups who were distressed at one or the other or both of the time-points in the study.

Coping processes subsume a variety of thoughts, feelings, and behaviors reflecting the individual's efforts to "manage, master, tolerate, reduce, or minimize the demands of a stressful environment" (Taylor & Stanton, 2007, p. 378). Often, reference is made to "ways of coping," basic categories used to classify how people manage stress. Ways of coping can be (1) primary – coping efforts to influence objective events or conditions; (2) secondary – coping efforts aimed at maximizing one's fit to current conditions; or (3) relinquished – absence of any coping attempt, including acceptance and adjustment (Skinner, Edge, Altman, & Sherwood, 2003). Most commonly, researchers distinguish between *problem-focused coping* (efforts directed toward the stressful situation) and *emotion-focused coping* (efforts directed toward reducing distress). The former have been more consistently associated with positive outcomes in research (e.g., lower psychological distress, better health) than have the latter (Taylor & Stanton, 2007). Janoff-Bulman and Frieze (1983) viewed coping as the process of rebuilding one's assumptive world, of coming to terms with shattered assumptions. Survivors seek to redefine the event to minimize threat and the perception of oneself as a victim. This way of coping can involve comparing oneself to less fortunate others, creating hypothetical worse worlds, construing benefit, and manufacturing normative standards of adjustment.

Skinner et al.'s (2003) extraordinary *Psychological Bulletin* article summarized a variety of conceptual issues that have plagued coping theory and research almost from the beginning. They noted the lack of consensus about core coping strategies, and they recommended abandoning the three most common classification schemes: problem-focused vs. emotion-focused coping; approach vs. avoidance; and cognitive vs. behavioral coping efforts. Instead, they advocated for developing a hierarchical understanding of coping actions. At the lowest level of the hierarchy are *instances of coping*, the "countless changing real-time responses that individuals use in dealing with specific stressful transactions" (p. 217). Instances are concrete examples of *ways of coping*, which in turn, are nested within higher-order *families of coping*. Finally, families of coping can be organized into even higher-order adaptive processes, called *concerns* in this scheme. The three primary concerns are organized around challenges and threats to achieving/ protecting (1) competence or control, (2) attachment or relatedness, and (3) autonomy. On the basis of an exhaustive search and analysis of past research on coping, Skinner et al. (2003) identified 12 families of coping that appear to be most consistently important. These are listed as follows, in a modified version of Figure 4 (p. 245) from their paper. For example, *planning* is a way of coping within the family of *problem-solving*, which

encompasses one class of approaches to managing challenges or threats to one's *competence or control*.

Concerns (Adaptive Processes)	Families of Coping (Functions)	Illustrative Ways of Coping
Competence/ Control (efforts to coordinate actions and contingencies in the environment)	Problem-solving (adjust action to be effective)	Strategizing, instrumental action, planning
	Information seeking (find additional contingencies)	Reading, observing, asking others
	Helplessness (find limits of actions)	Confusion, cognitive interference or exhaustion
	Escape (flee danger or environment)	Cognitive avoidance, behavioral avoidance, denial
Attachment/ Relatedness (efforts to coordinate reliance and social resources available)	Self-reliance (protect available social resources)	Emotional regulation, behavioral regulation
	Support Seeking (use available social resources)	Proximity seeking, yearning, other alliance
	Delegation (find limits of resources)	Complaining, self-pity
	Isolation (withdraw from unsupportive context)	Social withdrawal, concealment of problem
Autonomy (efforts to coordinate preferences and available options)	Accommodation (flexibly adjust preferences and options)	Cognitive restructuring, minimization, acceptance
	Negotiation (find new options)	Bargaining, persuasion, priority-setting
	Submission (give up preferences)	Rumination, intrusive thoughts
	Opposition (remove constraints)	Other-blame, projection, aggression

3.3.1 Coping Self-Efficacy

A variation on the theme of ways of coping is *coping self-efficacy*. As noted earlier in this report, self-efficacy is a fundamental expression of human agency. "Whatever other factors serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired effects by one's actions, otherwise one has little incentive to act or to persevere in the face of difficulties" (Benight & Bandura, 2004, p. 1131). Within the context of stress and coping, self-efficacy perceptions are often labeled coping self-efficacy. General self-efficacy is a trait-like factor, which relates to capacities to manage demands across different situations. Coping self-efficacy is usually defined and measured within particular domains; situation-specific beliefs of coping efficacy are more proximally related to behaviors, although these beliefs may be influenced by the general trait (Benight & Bandura, 2004).

One way of thinking about coping self-efficacy is that it has less to do with *how* one copes – that is, it matters little whether the way of coping is problem solving, avoidance, or cognitive restructuring – and more to do with whether or not one believes he or she can manage the

particular problem or threat. This concept has much face validity. Chip Benight has been especially influential in advancing the importance of coping self-efficacy in the context of disasters. Through a series of studies of events ranging from hurricanes in Florida to floods in Colorado to the bombing in Oklahoma, Benight has shown that coping self-efficacy is proximal to well-being and often mediates the effects of other coping resources, such as dispositional optimism and social support (Benight & Bandura, 2004). For example, in this view, social support influences mental health primarily because it raises the recipient's self-efficacy to manage environmental demands.

In a recent meta-analysis, Lusczcynska, Benight, and Cieslak (2009) systematically reviewed research for relations between self-efficacy and psychological outcomes within the context of mass trauma. They found medium to large effects of self-efficacy on distress and PTSD symptoms in cross-sectional studies and large effects in longitudinal studies.

3.4 Social Support Dynamics

Decades of research have consistently demonstrated that social support reduces distress and promotes adjustment under conditions of stress (Taylor & Stanton, 2007). Social support refers to social interactions that provide individuals with actual assistance and embed them into a web of social relationships perceived to be loving, caring, and readily available in times of need (Barrera, 1986). This general definition points to three major facets of social support: *social embeddedness* (quantity and types of relationships with others), *received support* (actual receipt of help), and *perceived support* (the belief that help would be available if needed, together with a sense of belonging and being cared for). In a nutshell, *perceived support* refers to helping behavior that *might* happen, *received support* refers to helping behavior that *does* happen, and *social embeddedness* represents the most basic structural component from which these functional components emerge. In this section, I will first discuss social support conceptually, and then I will summarize results from empirical tests of its functions in the aftermath of disaster. This conceptual summary borrows heavily from previous reviews of the disaster social support literature (Kaniasty & Norris, 1999; 2004).

Social support is a powerful protective factor for all types of stress and trauma (Brewin, Andrews, & Valentine, 2000; Cobb, 1976; Cohen & Wills, 1985; Cutrona & Russell, 1990; Sarason et al., 1991) but is complicated after disasters. Initially, there is a strong *mobilization* of social support, but later, paradoxically, there is a *deterioration* of social support. In the immediate aftermath of disasters, high levels of mutual helping materialize. Temporarily, at least, people spontaneously share experiences and are uplifted by the recognition that others care. This phase during which the mobilization of support predominates and help is abundant has earned a variety of heartwarming labels, such as "altruistic community," "heroic phase," "honeymoon phase," and "postdisaster utopia." In the longer period that follows, the realities of loss and the formidable challenges of recovery must be faced. The heightened level of helping and cohesion seldom last. The attentive media and generous outsiders leave to another crisis. With the passage of time, camaraderie is replaced by grief, anger, and disillusionment.

Many things can lead to postdisaster declines in perceived social support. Because disasters affect entire communities, the need for support may simply exceed its availability, causing expectations of support to be violated. Relocation and job loss – and even death following the most severe events – remove important others from victims' supportive environments. Disaster victims often abandon routine social activities, leaving fewer opportunities for companionship and leisure. Social networks become saturated with stories of and feelings about the event and may escape interacting. Whereas victims want and need to be listened to, they and others in their

social environments may not necessarily wish to be the listeners. Physical fatigue, emotional irritability, and scarcity of resources increase the potential for interpersonal conflicts and social withdrawal. Different groups of victims may sometimes find themselves at odds.

In tests of their *social support deterioration* model, Kaniasty and Norris (1993) showed that declines in perceived support occurred after disasters and that these declines affected mental health adversely. These tests were based on data collected from victims of floods in Kentucky for whom both predisaster and postdisaster data were available. Flood victims reported lower perceived social support after the flood than they had reported before the flood. The erosion of social support was one path through which the disaster led to distress. That is, flood victims experienced the impact of the disaster both directly and indirectly, through deterioration of their social support. Since this time, evidence has continued to grow regarding the adverse impact of disasters on perceived support and social embeddedness (e.g., Norris et al., 2005) as well as regarding the protections afforded by postdisaster social support over time (e.g., Kaniasty & Norris, 2008).

The deterioration of support is, fortunately, not inevitable. Extending their previous model of social support deterioration, Norris and Kaniasty (1996) proposed and tested a model of *social support deterioration deterrence* (SSDD). The hypothesized relations between exposure, social support, and distress are shown in the various paths of the SSDD model, as shown in Figure 4. In the SSDD model, the mobilization of support is evidenced in the hypothesized *positive* effect of severity of exposure on *received* social support; the more severe the exposure, the more help is received. The deterioration of support is evidenced in the hypothesized *negative* effect of severity of exposure on *perceived* social support; the more severe the exposure, the greater the likelihood that perceptions of social support availability and belonging will suffer. "Deterioration deterrence" occurs because received support protects against declines in perceived support (protective assistance); the mobilization of received support to a greater or lesser extent *offsets* or *counteracts* the forces that lead to the deterioration of perceived support. All effects of received support (actual help received from family/ friends) operated through the maintenance of positive perceptions/ expectations of social support and belonging. The mobilization of support to an extent, although not completely, counteracted the deterioration of support.

Using data collected 12 and 24 months after Hurricane Hugo and 6 and 28 months after Hurricane Andrew, and the methods of structural equation modeling, Norris and Kaniasty (1996) found strong evidence for the hypothesized SSDD model. Although more severe disaster exposure was associated with lower perceptions of support, the *total* effects of disaster on perceived support were *less severe than they might have been* because exposure was positively associated with received support, and received support was positively associated with subsequent perceived support. In other words, survivors who received very high levels of help following the hurricanes were protected against salient erosion in expectations of support. This finding indicates that the more we can do to help disaster survivors mobilize – and sustain – social support, the more resilient they will be.

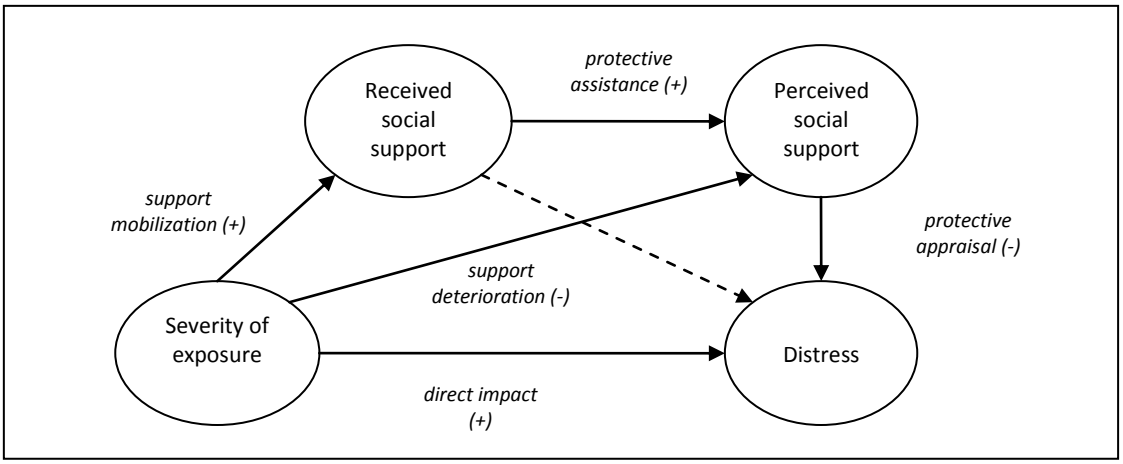

Figure 4. Social support deterioration deterrence model. Solid lines indicate paths hypothesized (and shown) to be significant; the dashed line indicates the path hypothesized (and shown) to be non-significant. *Source:* Norris and Kaniasty (1996, p. 502).

Tangible, informational, and emotional forms of help are all needed after disasters (Kaniasty & Norris, 2004). Tangible support may be the easiest form to provide. Indeed, both governmental and non-governmental agencies provide victims of disaster with essential shelter, food, money, and loans to hasten physical and fiscal recovery. Family and friends' orientation to *do* something further augments the abundance of tangible support. However, informational support may be even more important than tangible support after human-caused disasters characterized by invisibility, confusion, and uncertainty. Emotional support is also important after disasters, as it is in most times. Notwithstanding the essential role government agencies and other formal sources of support play in the aftermath of disasters, the greatest challenge lies in fostering naturally occurring social resources, which are most vital for disaster survivors, especially with regard to the exchange of emotional support.

The SSDD model documents processes wherein helping activities counteract the forces of support deterioration. Unfortunately, our research has also shown that various factors interfere with the adequacy of support receipt. Disaster-stricken communities are not always ruled in the most egalitarian way (Kaniasty & Norris, 1995). Ideally, the mobilization of support in a community follows the *rule of relative needs*, as represented in the figure by the path from severity of exposure to received support. Simply put, the most support goes to those who need it the most. Sometimes, however, the distribution of support follows the *rule of relative advantage*. Factors such as ethnicity and economic status are key variables affecting receipt of support after disasters. Socially and economically disadvantaged groups are frequently too overburdened to provide ample help to other members in time of additional need.

3.5 Closing Note for Section 3

It is often observed that "what is stressful for one individual is not necessarily so for another." This truism is strained in the disaster context, where the stress is profound, far-reaching, and objectively inarguable. Yet, individual differences in resilience and recovery cannot be denied. Individuals who possess stronger psychosocial resources before the event are likely to show greater resilience after. Their post-event appraisals, coping efforts, and social interactions further shape and define the rapidity of their adaptation. Importantly, the stress

process is amenable to change, and this is where our attention turns for the final part of this report.

4. IMPLICATIONS OF BEHAVIORAL SCIENCE: RESILIENCE AND INTERVENTION

While behavioral scientists often conclude papers by drawing an implication or two for intervention, certain writers have aimed more intentionally to derive lessons from research that are useful for programs or policy. Masten and Obradovic (2008), for example, reviewed the literature on resilience to draw principles for disaster planning. Cogently, they observed that "the best surveillance, equipment, communication systems, antiviral supplies, military, and emergency services in the world will not be effective without equal attention to the issues posed by human behavior under conditions of life-threatening danger to children and families (p. 9)." These authors discussed the importance of considering the nature of the threat and the developmental timing of the experience. They noted that the experiences and responses of individuals will be influenced by the functioning of systems in which they are embedded and particularly by the behavior of the people they trust or who provide a secure base in an attachment relationship. They recommended that planners identify the most likely "first responders" for vulnerable populations, for example, parents and teachers in the case of children, and help them prepare to respond effectively.

For concluding this report, I will return to a "big picture" perspective on resilience. Over 30 years ago, Barbara Dohrenwend (1978, p. 2) presented "a model of the process whereby psychosocial stress induces psychopathology and some conceptions of how to counteract this process." This model is reproduced in Figure 5.

The heart of Dohrenwend's model is the idea of the *transient stress reaction*, a reaction that resembles disorder but is inherently transient or self-limiting. Three possible outcomes follow the natural stress reaction: (1) *growth*, in which the individual uses the event to develop further psychologically; (2) *status quo*, in which the individual returns to pre-event psychological state; and (3) *disorder*, in which the stress reaction persists and appears to become self-sustaining. The next layer of the model consisted of the various personal and situational assets that come into play at various stages of the stress sequence, potentially influencing the very occurrence of stress as well as the final outcome (i.e., growth, status quo, or disorder). The final layer of Dohrenwend's model illustrated potential points of intervention, ranging from political action to corrective therapy. One of the appealing features of this model was how seemingly disparate activities took on, in Dohrenwend's words, "a satisfying coherence and directedness." The prevention/ intervention activities were all directed at undermining the process whereby stress generates psychopathology, but *they tackled it at different points*. This message remains ever so critical for a field (resilience) guided by multiple disciplinary perspectives.

Norris and Thompson (1995) elaborated on Dohrenwend's framework with a focus on traumatic events, especially disasters. The final layer of their model organized potential points of intervention along two dimensions. The first dimension was the *timing of the intervention*. Here the authors distinguished between interventions taking place before the crisis (primary prevention), during or shortly following the crisis (secondary prevention), or after the crisis (tertiary prevention). The second dimension was the *level of the intervention*. Here the authors distinguished between interventions targeting individual-level attitudes and practices or societal-level attitudes and practices.

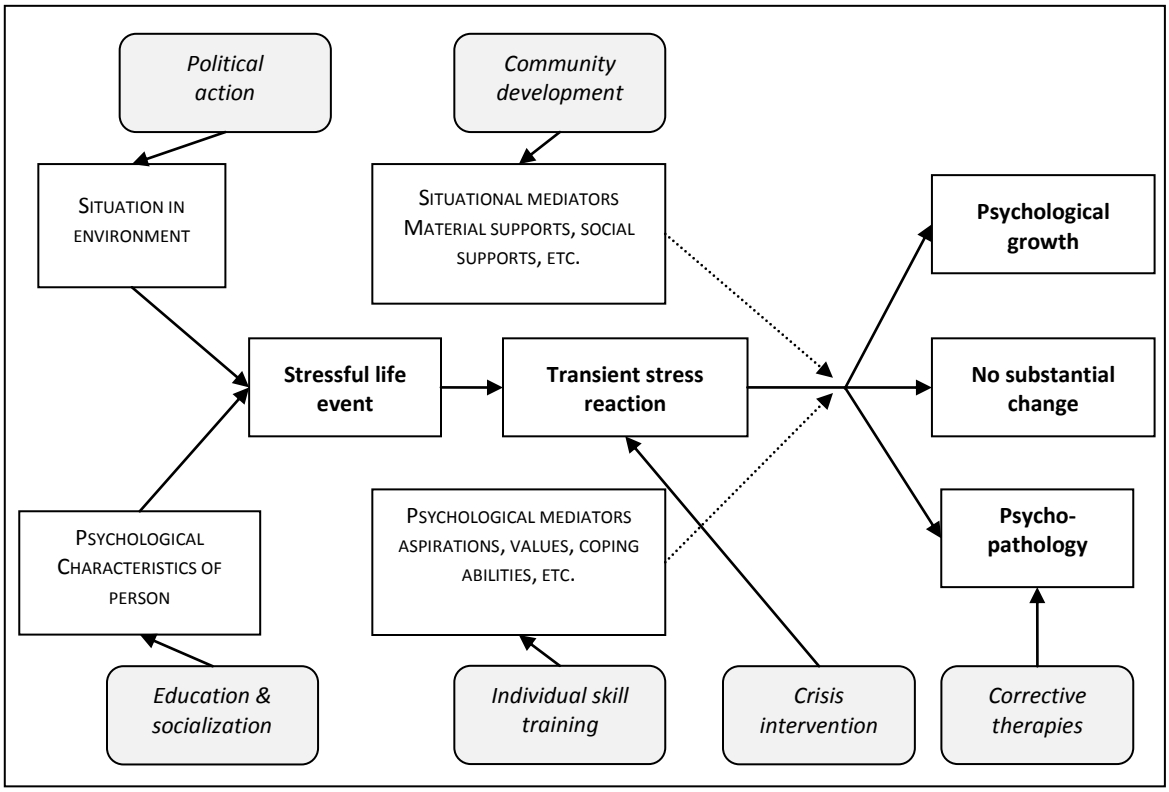

Figure 5. A model of the process whereby psychosocial stress induces psychopathology and some conceptions of how to counteract this process. With kind permission from Springer Science+Business Media: *American Journal of Community Psychology*, "Social stress and community psychology," vol. 6, 1978, p. 2, B. S. Dohrenwend.

It is not difficult to translate these earlier models into contemporary ones that use a resilience frame. Primary prevention activities taking place before the stressful event or disaster aim to boost *resistance*; secondary prevention activities taking place during or shortly after the event aim to boost *resilience*; and tertiary prevention activities taking place later in time aim to foster *recovery*. Whereas resistance is the hypothetical ideal, the best possible outcome is not always resistance, nor is it always resilience. Appropriate interventions should increase the likelihood of resilience among people who were not resistant and the likelihood of recovery among people who were not resilient. All prevention strategies are necessary to provide a continuum of postdisaster care (Norris & Rosen, 2009; Norris et al., 2009).

Behavioral scientists are increasingly interested in intervention research, including tests of particular psychotherapies for survivors of disasters and terrorism. For example, Hamblen and colleagues (2009) tested the effectiveness of Cognitive Behavior Therapy for Postdisaster Distress (CBT-PD) in a sample of survivors of Hurricane Katrina. This manualized intervention emphasizes cognitive restructuring, a technique that challenges inaccurate, unhealthy beliefs. Participants were assessed at referral, pretreatment, intermediate treatment, and posttreatment and showed significant and large improvements. Brewin and colleagues described a "screen and treat" approach that was implemented after the 2005 London bombings. Outcome data revealed large effect sizes for cognitive behavioral treatments of persons who screened positive for PTSD.

However, despite some progress, it remains largely true as of this writing that the evidence base for psychological interventions in the aftermath of disasters is weak. Because of a variety of real-world challenges, clinical interventions are rarely tested, and programs are rarely evaluated (but see Norris & Rosen, 2009). A few years ago, noting that it was unlikely that evidence from clinical trials would be forthcoming soon, the National Center for PTSD organized a worldwide panel of experts and charged them to reach consensus on intervention principles. This led to the publication of a seminal *Psychiatry* paper by Stevan Hobfoll and a long list of collaborators (2007), in which the authors drew recommendations from the empirical literature about immediate and mid-term interventions in the aftermath of mass trauma. They defined intervention in the broadest sense, ranging from provision of community support and public health messaging to clinical assessment and intensive therapy. They looked for intervention-related foci that were best supported by the literature as promoting stress-resistant and resilient outcomes following exposure to extreme stress.

Organizing their conclusions as "five essential elements of mass trauma intervention," these experts believed that post-disaster interventions should aim to promote safety, calming, efficacy, connectedness, and hope. The overlap of this list of essential elements with the constructs reviewed in this report is notable. The panel's concern for *promoting safety* arose from investigations relating to both objective and subjective risk. For example, the belief that the world is dangerous is a dysfunctional cognition that mediates development of PTSD (see Section 3). Safety includes safety from bad news, rumors, and other factors that may increase threat perception. As for *promoting calming*, the panel observed that exposure to mass trauma often results in marked increases in emotionality. Some anxiety is normal. The question is whether such arousal increases and remains at such a level as to interfere with sleep, eating, and performance. "Normalization" is a key intervention principle to enhance calming. The element of *promoting efficacy* should come as no surprise; the importance of having a sense of control over outcomes has already been discussed several times in this report. Hobfoll et al. noted that the principle can be extended to collective efficacy, which is the sense that one belongs to a group that is likely to experience positive outcomes. As support for the goal of *promoting connectedness*, the authors referenced the tremendous body of research on the central importance of social support, but noted the complexities of sustaining support highlighted by the Social Support Deterioration Deterrence model (Norris & Kaniasty, 1996). Finally, the authors reviewed evidence for the element of *promoting hope* following mass trauma. Disagreeing to an extent with Snyder's construal of hope as composed of agency and pathways (see Section 1), Hobfoll et al. (2007) argued that hope has a religious connotation for many and is not necessarily action oriented. Such individuals find hope not through agency but through belief in God.

In greater detail than I can present here, Hobfoll and colleagues outlined a series of public health measures and individual/ group measures that could be taken to promote safety, calming, efficacy, connectedness, and hope. They identified approaches that should not be used as well as those that were recommended. This paper should be required reading for anyone charged with developing interventions to promote the resilience of individuals after disasters or terrorist attacks.

Hobfoll et al.'s *Psychiatry* article was followed by a series of invited commentaries, prepared by experts in the trauma field. These papers drew additional conclusions for programs and policies. In their contribution to this set, Norris and Stevens (2007) discussed areas of overlap between the Hobfoll et al. framework and the Norris et al. (2008) community resilience model. In particular, they highlighted how efforts to promote *community* resilience would achieve the five essential elements of mass trauma intervention. This observation circles back to the point

made in introducing this review regarding the mutual, transactional relationship between individual and community. The resilience of one cannot be determined in isolation from the other.

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