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## CHAPTER 31

# *Successful Aging in Very Old Adults: Resiliency in the Face of Natural Disaster*

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In recent years, geropsychologists, among others in the social sciences, have stressed the point that people are living longer today than ever before. This demographic reality, known as the “graying” of America, has numerous implications for practicing clinicians as well as others in the service delivery fields. As society continues to age, those in the helping professions will have increasing contact with older persons as there is a growing need for social and economic resources to meet the practical needs of elderly people in society. The “oldest-old” (i.e., people 85 years of age and older) are the fastest-growing segment of our population. Not surprisingly, they are also the ones with the greatest health care needs. As the post-World War II baby-boom generation approaches late adulthood (i.e., those 76 million people born between 1946 and 1964), statistical projections rise accordingly. Specifically, by the year 2030, it has been estimated that 70 million Americans, which is one-fifth of the U.S. population, will be 65 years of age and older. Critically, an estimated 8.9 million of them will be over age 85 (Administration on Aging, 2001). Thus, careful consideration of the social, economic, and political ramifications of an aging population, with special attention to the oldest-old, is vitally important and a critical focus for behavioral research in the social sciences.

In light of these national demographic trends, successful aging emerges as a critical concept and challenge for the twenty-first century. It has been widely recognized that a proper diet and adequate physical activity can lead to a variety of health benefits, such as reduced chronic disability; enhanced immune, cardiovascular, and muscular functioning; and improved emotional status (U.S. Department of Health and Human Services, 1996). Conversely, a poor diet, sedentary lifestyle, and other health risks such as obesity may promote the occurrence of age-related diseases that contribute to disability in adulthood (Reynolds, Saito, & Crimmins, 2005). Physical health status may also influence older adults’ psychological well-being (Borchelt, Gilberg, Horgas, & Geiselman, 1999). Physical illness often goes along with diminished functional capacity in everyday life (Borchelt et al., 1999; Steinhagen-Thiessen & Borchelt, 1999). For many younger adults, physical illnesses are neither chronic nor associated with long-term or permanent disability.

As a person ages, the probability of suffering from an illness or chronic condition that leads to disability, immobility, or chronic pain, increases. These outcomes lessen the ability to exert control over everyday activities and future events, which could result in feelings of helplessness and depression (Karel, 1997).

Generally speaking, age differences in physical functionality among younger and older adults are easily recognized. In contrast, age-related changes in cognition among otherwise healthy older adults may be more subtle and less noticeable for those without formal training in the psychology of aging. Accurate appraisal of the cognitive competencies of elderly persons is critical, given that cognitive decrements in late life may influence interpersonal communication and exchange of information. Age deficits in cognitive abilities, such as memory, language, decision making, among other mental skills, typically occur in late adulthood (Cherry & Smith, 1998). Lapses in memory may be experienced at any point in the life course, but societal aging biases often exaggerate the flaws of aging, routinely attributing temporary, normal memory lapses to so-called senior moments. As Cruikshank (2003) suggests, we are not apt to blame a 20-year-old forgetting someone's name or where they placed their checkbook as a twenty-something moment. Accordingly, practicing clinicians, among others, should exercise caution and not prematurely conclude that what may be normative cognitive aging constitutes definitive evidence of adult dementia in its early stages.

Current demographic trends coupled with the growing percentage of persons aging with disabilities underscores the need for programs geared toward disability prevention and interventions to foster healthy aging. Isolating the variables that may contribute to successful aging, such as a person's genetic constitution, nutrition, physical activity behavior, exercise habits, and positive outlook is an important challenge with implications for improving quality of life and decreasing the financial burden associated with medical care in late adulthood. Understanding the multifaceted nature of physical, psychosocial, and cognitive aging is also critical for fostering appropriate expectations for elderly persons and avoiding ageist stereotypes that portray a negative image of a person's competence in late life.

In this chapter, we explore the impact of natural disasters on well-being and quality of life in older adults. Our guiding assumption is that natural disasters provide a context for examining adaptation and resiliency in the face of a significant environmental stressor and may provide new insights into current views of successful aging. In the first section, we focus on the consequences of natural disasters from a health and wellness perspective. In particular, we examine the nature of psychological distress, resource and personal loss, and differential vulnerability of certain groups, with emphasis on older persons. In the second section, we discuss various approaches to successful aging, considering disasters as a context to study adaptation, growth, and resiliency in late life. In the third section, we focus on the Louisiana Health Aging Study (LHAS), a multidisciplinary study of the determinants of longevity and health aging in the oldest-old, defined as persons 90 years of age and older. We present select data from the LHAS hurricane study that examined the impact of Hurricanes Katrina and Rita on psychological well-being and health-related quality of life in middle-age, young-old, and very old adults. We conclude by considering the methodological implications of the LHAS findings for future

research on postdisaster psychological reactions and we offer practical suggestions for promoting successful aging in late adulthood.

## NATURAL DISASTERS AND MENTAL HEALTH

Natural disasters occur worldwide. With or without warning, disasters such as tornadoes, hurricanes, storms, tsunamis, earthquakes, volcanic eruptions, and snowstorms can eliminate an entire region and suddenly disrupt life within entire communities. Natural disasters tend to be catastrophic and are characterized by widespread destruction of property. They often result in many injuries (often with loss of life), and direct or indirect consequences to many persons and their families (Oriol, 1999). Natural disasters are detrimental to mental health and may produce a variety of different reactions in victims and nonvictims alike. For instance, disasters typically result in physical and psychological distress, although only a minority of people who experience a disaster will develop a psychological disorder. That is, psychological symptoms and distress are likely for those who have experienced disaster-related losses, although such reactions typically do not mark the beginning of clinical disorder (Phifer, 1990; Phifer & Norris, 1989). Substantial individual differences are seen in personal responses to stressful events, such as natural disasters. Psychological vulnerability after stressful life events varies widely with greater risk noted for certain sociodemographic groups, including women, unmarried people, and those with lower education, lower income, or occupational status (Thoits, 1982).

The Federal Emergency Management Agency (FEMA) has defined a disaster as, "An occurrence of severity and magnitude that normally results in deaths, injuries, and property damage and that cannot be managed through routine procedures and resources of government. It requires, immediate, coordinated, and effective response by multiple government and private sector organizations to meet human needs and speedy recovery" (Oriol, 1999, p. 6). Once the government either anticipates the onset of a disaster (i.e., hurricane) or a disaster has occurred (i.e., earthquake), they will step in and take the necessary steps to ensure the safety of the affected population.

Natural disasters have numerous consequences including adverse effects on a person's mental health. Following exposure to any disaster, strong emotions are overwhelming to many individuals and it is not necessary to feel a sense of loss or lack of control to feel overwhelmed. According to the Center for Mental Health Services (1994), a strong sense of such emotions following a disaster may lead to one of two types of disaster trauma: *Individual trauma*, which the CMHS has described as "a blow to the psyche that breaks through one's defenses so suddenly and with such brutal force that one cannot react to it effectively"; and *collective trauma*, described as "a blow to the basic tissues of social life that damages the bonds attaching people together and impairs the prevailing sense of community" (CMHS, 1994, as cited in Oriol, 1999, p. 10). These types of trauma, while normal reactions, have been shown to lead to severe forms of stress and posttraumatic stress disorder (PTSD) if not addressed.

Certain situations have been found to perpetuate the onset of stress and added grief (CMHS, 1994); these situations may include the location of missing family

members, lack of resources, loss of personal property, relocation to a new area, and loss of traditions and values. Based on past experience, governmental agencies now focus on the practical applications of mental health assistance, instead of a psychological approach. Individuals may need resources or problem-solving ideas to resolve the emotional disturbance that has occurred. In recent years, disaster relief teams have offered programs that are tailored to specific areas where disasters may commonly occur (i.e., California and earthquakes). These primary support teams have been considered a crucial part to the mental health recovery of disaster victims (Oriol, 1999).

With respect to mental health and aging, approximately 15% to 25% of older adults in the general population are thought have symptoms of mental health problems. Available estimates may be an underestimate because older people tend to avoid utilizing mental health services compared to younger adults (Oriol, 1999). Nonetheless, there are many critical variables to consider that likely influence mental health outcomes when older persons are faced with stressful situations such as natural disasters. For example, older persons often experience greater declines in physical health, decreased functional capacity, declines in sensory abilities, and fewer social and economic resources compared to younger people (Massey, 1997; Oriol, 1999; Phifer, 1990). The presence of depressive symptoms prior to a stressful event may also contribute to subsequent depression symptoms for older adults (Kraaij, Pruyboom, & Garnefski, 2002). For people of all ages, preexisting major depressive disorder is generally thought to increase the risk for developing PTSD after exposure to a traumatic event by more than twofold (Breslau, Davis, Andreski, Peterson, & Schultz, 1997; Shalev et al., 1998). Careful consideration of an individual's psychological state prior to experiencing a disaster, whenever possible, would be a necessary first step for an accurate assessment of mental health in the postdisaster period.

### **Natural Disasters and Aging**

Historically, older people have been considered an at-risk group in times of intense stress or uncertainty (Friedsam, 1960). Older people may be more vulnerable to the impact of natural disaster than other age groups because they may be less likely to receive warning, less willing to evacuate, less likely to survive, and experience more disruption and disturbance in life postdisaster (Friedsam, 1960; Phifer, 1990). Older adults may also be less likely to acknowledge dangerous situations and utilize disaster assistance (Kilijanek & Drabek, 1979; Massey, 1997). Whether older adults are more vulnerable than others to disasters has sparked debate in the literature (Phifer, Kaniasty, & Norris, 1988). This controversy may in part be due to the variety of methodological issues and a lack of conceptual clarity that complicates the assessment of disaster effects on psychological states (Green, 1982). For example, vulnerability may be defined and expressed in many different ways. In one approach, the definition of vulnerability focuses on the relative risk of physical injury, injury to family members, and the accumulation of debt (Ferraro, Morton, Knutson, Zink, & Jacobson, 1999). Other approaches to vulnerability include witnessing tragedy, such as the death of a family member, and experiencing terror, horror, and

threat to lives and property (Canino, Bravo, Rubio-Stipec, & Woodbury, 1990). A critical methodological consideration is whether predisaster symptoms or other information about the participants are available that permit the use of a prospective design (Drabek & Key, 1984; Green, 1982; Robins, Fischbach, Smith, Cottler, & Solomon, 1986). Retrospective designs where only postdisaster assessments are obtained may be suggestive of increased psychopathology after a disaster, but cannot determine unequivocally whether the apparent increases in psychological symptoms are due to the disaster per se, or to the tendency to blame the disaster for mental health problems that existed before the disaster (Canino et al., 1990). In the studies that follow, prospective designs were used where psychological symptoms were measured prior to the disaster and their influence statistically controlled for using regression techniques.

Phifer and Norris (1989) examined the nature, duration, and time course of psychological reactions in people age 55 years and over to the southeastern Kentucky floods of 1981 and 1984 using a prospective design with five follow-up intervals after initial assessment in a panel study of stress, resources, and mental health. Flood exposure variables included personal losses and level of community destruction. Results confirmed that both floods influenced subsequent measures of psychological symptoms after controlling for preflood symptoms. Factor analysis on four dimensions of subjective mental health (negative affect, positive affect, somatic symptoms, cognitive symptoms) indicated that personal losses predicted declines in positive affect and increases in negative affect within the first year postflood but not thereafter. Community destruction was associated with decreased positive affect up to 2 years postdisaster, with stronger effects noted in the spring assessments, suggestive of "anniversary effects." Exposure to both personal losses and a high level of community destruction predicted increases in negative affect for 2 years postdisaster. These findings demonstrate enduring psychological distress following floods for older persons (see Krause, 1987).

Whether older persons were differentially impacted cannot be determined from Phifer and Norris' (1989) report due to the absence of younger reference groups. In a later study, Phifer (1990) focused on the 1984 southeastern Kentucky flood data divided into three comparison age groups (55 to 64, 65 to 74, 75 years and older). Results indicated that 40% to 60% of the variance in psychological symptoms was accounted for by preflood symptoms. Thus, participants' reactions appeared to be a continuation of preflood problems not the onset of clinically defined disorders. Flood exposure was related to modest increases in depressive, anxiety, and somatic symptoms 16 to 18 months postflood, but accounted for less than 3% of the variance. Overall, persons with lower occupational status, men, and those aged 55 to 64 years had greater risk for increases in psychological distress, suggestive of differential vulnerability for certain segments of the older adult population.

Other evidence has shown that older adults are minimally affected by natural disasters in terms of psychological functioning and self-perceptions of health, implying that they may be more resilient to the negative effects of a natural disaster than previously assumed (Ferraro, 2003). Norris and Murrell (1988) found that older adults with previous flood experience did not show increased anxiety responses after the southeastern Kentucky flood of 1984, whereas older adults with minimal prior flood

experience showed much stronger effects. These findings were corroborated in a subsequent study where Phifer and Norris (1989) found that prior flood experience enhanced adaptation to the 1984 flood. Taken together, these findings imply that older adults show remarkable adaptability and postdisaster resiliency, implying that a lifetime of accumulated experience may provide a psychological buffer that acts to reduce or minimize negative outcomes postdisaster.

### **Clinical Implications**

Older adults are often considered a special risk group for postdisaster distress (Friedsam, 1960; Massey, 1997), yet prior research yields a complicated picture of disaster impact on elderly persons. Some researchers have found a significant impact of natural disasters on older adults' physical health (Phifer et al., 1988) and psychological symptoms (Phifer, 1990; Phifer & Norris, 1989). However, others have argued that older adults may be less vulnerable and better able to cope with stressful situations compared to their younger counterparts (Phifer & Norris, 1989; Tracy & Galea, 2006).

For older persons suffering from poor mental health, the occurrence of a natural disaster may worsen their condition, as well as ongoing physical health problems due to changes in social functioning and disruption in care-seeking behaviors (Tracy & Galea, 2006). Additionally, persons with a history of PTSD, depression, anxiety disorders, and substance abuse disorders may be more vulnerable to new trauma due to their latent emotionality and inability to handle the considerable demand that follows a natural disaster (Franklin, Young, & Zimmerman, 2002). It is imperative for practicing clinicians, among others in the health service fields, to be acquainted with the variety of challenges and issues faced by elderly persons in the wake of a natural disaster.

Thompson, Norris, and Hanacek (1993) made the point that people who live through natural disasters carry their personal histories with them, including social support resources and coping skills and abilities. These individual difference characteristics, coupled with disaster-related burdens unique to the person and his or her situation, may ultimately determine who will be the most or least vulnerable to adverse disaster effects. Regardless of age or gender, the effects of any given disaster should be evaluated in the context of the life course of the individual (see also Norris & Murrell, 1988).

### **PERSPECTIVES ON SUCCESSFUL AGING: IMPLICATIONS FOR DISASTER RESILIENCE**

Successful aging is an attractive concept in social gerontology that has captured the interest of researchers and the public alike in recent years (P. B. Baltes & Baltes, 1990; Rowe & Kahn, 1998). Despite its intuitive appeal, no one agrees on the best way to define or measure this concept (Tate, Lah, & Cuddy, 2003). Many psychological variables have been identified as contributors to successful aging, such as independence, mastery/growth, engagement with life, and positive adaptation, among others (see Montross et al., 2006, for discussion). The retention of physical

and cognitive functionality is also important to the concept of successful aging, because the absence of either one would have serious implications for independent living (Berkman et al., 1993). The MacArthur Study of Aging (Rowe & Kahn, 1997) identifies three components of successful aging, each of which is assumed to interact with one another. These components include: (1) the absence of disability and disease and the lack of risk factors predisposing one toward these, (2) the maintenance of physical and cognitive function that promotes well-being, and (3) connection with other people and involvement in productive activities.

Conceptual frameworks that describe successful aging using research-based criteria, such as the Rowe and Kahn (1997) model, are useful for motivating basic research on the construct. However, research-based criteria for defining successful aging (e.g., absence of disease and disability) do not necessarily correspond to individuals' experience in late adulthood, which may include medical illness and/or physical disability, or their own personalistic views of successful aging (Phelan & Larson, 2002; Strawbridge, Wallhagen, & Cohen, 2002). In an empirical investigation of this issue, Montross et al. (2006) examined the interrelationships among self-rated successful aging and several research-based definitions of the construct. They found that the majority of persons in their study (92%) viewed themselves as "successful agers," whereas only 5% of their sample met the three objectively defined Rowe and Kahn (1997) criteria (see Strawbridge et al., 2002 for similar findings).

Montross et al.'s (2006) results underscore the importance of a comprehensive approach that takes older persons' views on successful aging into account, among other variables. For instance, coping strategies are a critical variable to consider when evaluating physical health and life satisfaction (Lohr, Essex, & Klein, 1988). Successful aging has also been viewed in terms of adaptive reminiscence (Wong & Watt, 1991), spirituality (Crowther, Parker, Achenbaum, Larimore, & Koenig, 2002), life satisfaction and an optimistic outlook, and personality growth (M. M. Baltes & Lang, 1997). Finally, most would agree that maintaining a high quality of life is certainly an important contributor to successful aging.

Quality of life is a relatively new concept that appeared in the 1970s, having conceptual origins that are traced to the field of philosophy where concerns over what constitutes a "good life" and how we should live to achieve a good life have been a source of debate for hundreds of years. In fact, Cicero wrote an essay on the nature of good aging in 44 B.C. (Jarcho, 1971), attesting to the longevity of interest and scholarly thought on the topic of aging well and quality of life. Given the current demographic imperative that projects increasing numbers of elderly persons in society today and in the future, health care professionals, among others, are quite naturally concerned about what constitutes quality of life and how to foster high quality of life among elderly persons. Defining quality of life then becomes an important challenge for social scientists (Lawton, 1991).

Sarvimäki and Stenbock-Hult (2000) present a model of quality of life that accounts for the role of the external conditions, such as the environment (including both biophysical and sociocultural factors) and intraindividual conditions, such as the health of the individual (including functional capacity, coping mechanisms, personality). These conditions are thought to mutually influence each other, and in



turn, lead to a sense of well-being, meaning, and value as the outcome variables. Their model assumes bidirectionality in that one who sees meaning in life and has a sense self-worth may possess functional capacity (e.g., proficiency in activities of daily living), health (both objective and subjective), and coping resources that in turn influences the organization of a person's environment. Accordingly, Sarvimäki and Stenbock-Hult (2000) define quality of life along the three dimensions of having a sense of well-being, seeing meaning in life, and having value or self-worth. In an empirical test of their model, Sarvimäki and Stenbock-Hult administered structured interviews that covered different aspects of life to a sample of 300 community-dwelling adults age 75 and older in Finland. Results yielded initial evidence of relatively high quality of life in this sample, based on the indicators just described, indicating that their model holds promise for furthering our understanding of quality of life as an important contributor to successful aging.

### Successful Aging and Disaster Recovery

In general, research on natural disasters and aging has proceeded atheoretically. Our review of prior research on disaster effects revealed several post hoc views that have been advanced to explain how natural disasters may affect health and psychological states in adulthood. These perspectives include the burden hypothesis (Solomon, Smith, Robins, & Fischbach, 1987), exposure hypothesis (cf. Thompson et al., 1993), resource hypothesis (Friedsam, 1960), maturation hypothesis (Knight, Gatz, Heller, & Bengtson, 2000), and inoculation hypothesis (Eysenck, 1983; Norris & Murrell, 1988). Each of these views has a somewhat different set of assumptions for how older adults may fare postdisaster. These views on disaster recovery and their implications for postdisaster psychological states are discussed more fully next.

The burden hypothesis holds that middle-aged persons are likely to be the most affected in the postdisaster period and are therefore more vulnerable than others who are at different points in the life course, including older adults. Middle-aged adults are viewed as differentially vulnerable because of their role as the economic provider with social and financial responsibilities for their families (Thompson et al., 1993). For some, dual sets of responsibilities associated with caring for dependent children and elderly parents may double the perceived burden, a situation for which middle-aged adults have been termed the *sandwich generation*. Indeed there is evidence confirming the differential vulnerability of middle-aged adults who shoulder a disproportionate share of economic and social responsibility in the posthurricane recovery period relative to younger and older adults (Thompson et al., 1993).

The exposure and resource hypotheses both lead to the expectation that older persons would fare more poorly following a natural disaster than younger groups. The exposure hypothesis originated from earlier findings showing that older persons were less likely to survive a natural disaster such as a hurricane (i.e., Friedsam, 1960). The assumption is that older people may be less likely to receive warnings and less likely to evacuate, as well as experiencing greater disruption and altered patterns of life in the postdisaster period. Prior findings that document a greater

adverse effect for older adults are consistent with this view. Similarly, the resource hypothesis holds that older adults suffer from reduced resources, including less coping capacity and poorer physical health than their younger counterparts. They may also have fewer social and economic resources compared to younger people (Kaniasty, Norris, & Murrell, 1990). Consequently, they may be more susceptible to disaster-related stress and should be more adversely affected in the postdisaster period (Phifer, 1990). Consistent with this view, older persons have been shown to receive less postdisaster assistance compared to younger adults (Kilijanek & Drabek, 1979).

The maturation hypothesis assumes that older people have lessened emotional reactivity to stressful life events such as natural disasters. That is, older adults may be less emotionally reactive than younger adults as a result of their more mature coping styles, accounting for the greater resiliency of older persons (Knight et al., 2000). However, we could argue that the greater wisdom and maturity that accompanies advanced age may result in lower levels of predisaster distress generally, as opposed to a reduction in disaster-specific distress that follows the event. Most would agree that predisaster mental health characteristics are an important determinant of postdisaster psychological outcomes. Thus, reduced emotional distress in older adults may simply be a natural consequence of their higher levels of well-being and psychosocial functionality prior to a natural disaster (Knight et al., 2000).

The inoculation hypothesis holds that prior experience with natural disasters may serve a protective function for older adults, insulating them from psychological distress and strong emotional reactions to subsequent natural disasters. This view is based on Eysenck's (1983) original inoculation hypothesis that holds that stress exposure actually increases peoples' ability to tolerate future stresses. Thus, older people are thought to fare better than we might expect and be more resilient in the event of a future disaster as a result of their earlier flood and hurricane experiences. Some studies have found that older persons' past experiences may protect them and reduce their stress following a similar disaster later in life (Ferraro, 2003; Knight et al., 2000).

### **Clinical Implications**

Findings that show adaptation and resiliency among older adults in the wake of natural disaster lend support to the inoculation hypothesis (Norris & Murrell, 1988). Moreover, such findings imply that those who meet the criteria for successful aging or consider themselves to be "successful agers" continue to thrive despite the obstacles, hurdles, and adversity they may have to overcome in the postdisaster recovery period. According to Phifer (1990), several factors may account for the relative resiliency of older adults. Older people may have a higher incidence of past resolved stressful experiences so in a general sense they are "experienced" victims (see Norris & Murrell, 1988, for discussion). Consistent with an inoculation perspective, older people may also have rich histories of coping with prior crises that act to reduce the impact of a current disaster experience. Furthermore, older people may have a lower incidence of unresolved stressful experiences in their daily lives.

That is, older adults may experience fewer life changes within a given time interval compared to younger adults. In contrast, for younger adults, the simultaneous occurrence of other life stressors and/or crises may exacerbate the impact of a given crisis, leaving them overwhelmed and vulnerable to the adverse effects of a natural disaster.

From a practical vantage point, findings of resilience and adaptation among older adults imply that they are not necessarily the ones in greatest need of postdisaster support services. Rather, we could argue that resilient older persons who adapt and cope successfully in the wake of a natural disaster may be ideally suited for providing disaster relief assistance for those middle-aged adults, among others, who may be differentially vulnerable. From a burden perspective, targeting interventions toward middle-aged adults may be the most sensible use of resources to assist communities that have suffered natural disasters. Older persons may be in a unique position to offer assistance and could be a valuable commodity for postdisaster victim advocacy and other, less physically strenuous, disaster relief efforts (Norris & Murrill, 1988 Thompson et al., 1993).

### **THE LOUISIANA HEALTHY AGING STUDY: IMPACT OF HURRICANES KATRINA AND RITA**

The Louisiana Healthy Aging Study (LHAS) is a multidisciplinary, population-based study of the determinants of longevity and healthy aging. Given the recent occurrence of hurricanes Katrina and Rita (HK/R) in the Gulf Coast region, we had a unique opportunity to examine the impact of this particular disaster across several domains of cognitive and psychosocial functioning currently under investigation in the LHAS with a prospective research design. The study population for the LHAS was drawn from eight parishes (counties) within approximately a 40-mile radius of Baton Rouge, Louisiana, including persons age 90 years and older (nonagenarians) and younger comparison groups. Data collection for the study began in January 2002. Hurricanes Katrina and Rita hit South Louisiana in August and September 2005, respectively. Thus, we were well into the third year of testing at the time of the hurricanes. Our immediate concern was to assess the impact of these storms on participants in the LHAS study sample for quality control purposes. We also wanted to use this opportunity to gain new evidence of storm impact, coping, and resiliency in a sample of very old adults.

By definition, research participants in the LHAS reside outside of the severely affected areas, so direct trauma exposure was correspondingly minimal. However, virtually all of the participants had children, grandchildren, and in some cases, great-grandchildren, as well as nieces, nephews, and other family members and close friends in the affected areas at the time of the storms. Moreover, family members, friends, and acquaintances of the LHAS participants from the affected areas evacuated to Baton Rouge and frequently stayed in the homes of these LHAS participants in the wake of the storms. Most would agree that witnessing the property damage and community destruction experienced by loved ones and friends is notably disturbing, having the potential for threats to health and/or lingering psychological effects. Understanding the influence of how family members and friends

may have fared in the storms on LHAS participants' emotional state and sense of well-being during the postdisaster recovery period was a significant motivation for the present study.

Hurricane Katrina made landfall on August 29, 2005, affecting primarily the lower Plaquemines and Orleans parishes in South Louisiana with 1,577 storm-related deaths (Hunter, 2006). Media coverage related to the storm largely focused on the Lower 9th Ward and Lakeview areas of New Orleans. St. Bernard, St. Tammany, and Washington parishes were also severely affected, although these parishes have received less media attention. In the greater Baton Rouge area approximately 80 miles from the regions directly affected by Katrina, tropical storm force winds and flooding were experienced across the city. Citizens in the greater Baton Rouge area experienced significant disruptions in the routines of daily living and a dramatically altered life with the influx of an estimated more than 200,000 evacuees, making Baton Rouge the state's largest city overnight. Hurricane Rita made landfall on September 24, 2005, affecting primarily Calcasieu, Cameron, and Vermillion parishes, the western side of the state.

Our primary aim was to examine the impact of a natural disaster on the oldest-old, defined as those age 90 years of age and older and their younger counterparts who ranged in age from 45 to 89 years. We utilized a subset of the original individual difference measures assessed in the LHAS to permit pre- and posthurricane comparisons by age group. Our second aim was to examine storm impact, coping, and resiliency using quantitative and qualitative measures that were developed specifically for use in this study. In addition, we included paper-and-pencil measures of anxiety, depression, and posttraumatic stress disorder to account for possible psychological distress due to the storms and their aftermath. These mental health measures were also new to the LHAS protocol. The original LHAS individual difference measures, the new storm impact questionnaires, and the mental health measures are described next.

### **Overview of Dependent Measures**

We developed a structured questionnaire to assess storm impact, modeled after a similar instrument used to assess the psychological sequelae of the 2004 Florida hurricanes (Acierno et al., in press). We also developed an open-ended storm impact questionnaire to assess previous hurricane and flood experiences; emotional reactions to HK/R; cognitive reactions to HK/R; coping—before storm; coping—after storm; and silver-lining/positive outcomes. Open-ended questions were administered to allow a wide range of responses to questions that assessed adaptive coping, resiliency, and psychological well-being in late life. Given that personality, contextual, and sociodemographic variables are needed to fully understand the impact of disaster on well-being, we included a personality measure, but these data are not included here and will not be discussed further.

### ***LHAS Individual Difference Measures***

All participants completed a shortened version of the original demographic questionnaire with three self-perceived health questions from the Older American

Resources and Services questionnaire (OARS; Duke University Center for the Study of Aging and Human Development, 1975) and other questions to assess possible changes in health status, medications, and lifestyle since the time of their initial research participation. The Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986) was originally chosen for inclusion in the LHAS protocol based on its extensive validation with older adults and the minimal number of items that may be attributed to physical illness. We re-administered the GDS to assess potential changes in affective status. We added a new measure of depression to the LHAS hurricane study that allowed us to calculate severity of depression scores, as discussed later.

The Medical Outcomes Study Short Form-36 (SF-36; Ware & Sherbourne, 1992) was re-administered to assess potential changes in postdisaster health-related quality of life. The SF-36 is comprised of eight indicators of general health, including physical functioning (PF), role limitations due to physical health problems (RP), bodily pain (BP), perceptions of general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional health problems (RE), and mental health (MH). Subscales are combined to form composite mental (MCS) and physical component scores (PCS). Normative data yields a mean of 50 and a standard deviation of 10 for the physical and mental health composite scores (Ware, Kosinski, & Keller, 1994). SF-36 scores range from 0 (lowest functioning) to 100 (highest functioning). Previous research has shown that the SF-36 possesses desirable psychometric properties, including construct validity (McHorney, Ware, & Raczek, 1993) and high internal consistency reliability for the eight subscales (McHorney, Ware, Lu, & Sherbourne, 1994).

### *Mental Health Measures*

Given the likelihood of strong emotional reactions and varied psychological symptoms that may follow a natural disaster (Oriol, 1999), we included three mental health measures to assess disaster trauma and psychological well-being. Because these measures were new to the LHAS, prehurricane comparison measures were not available. Symptoms of posttraumatic stress disorder were assessed using the PTSD Checklist (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers, Litz, Herman, Huska, & Keane, 1993). This 17-item self-report rating scale was originally developed to detect the presence of PTSD in military veterans (PCL-M). A modified civilian version has since been created (PCL-C) and was employed in this study. It has most commonly been employed in health settings and is frequently used when a structured interview is not possible. Participants rated how often they were bothered by 17 items using a 5-point scale. The severity rating scale ranged from "Not at all" to "Extremely." The overall measure of PTSD was calculated by summing the scores across all items.

The presence of depression was assessed using the GDS previously described and a public health questionnaire (PHQ-9). We administered portions of the Patient Health Questionnaire, specifically the PHQ-9 and PHQ-7. The PHQ-9 is a 9-item, self-report depression assessment form that was adapted from the Primary Care Evaluation of Mental Disorders (PRIME-MD) measurement (Spitzer,

Kroenke, & Williams, 1999). Each of the 9 items has been modified from the *DSM-IV* signs and symptoms for major depression. The PHQ-7, also adapted from the PRIME-MD, consisted of 7-items that allowed researchers to quickly identify symptoms of general anxiety disorder (Kelly, Russo, & Katon, 2001). The PHQ-9 and PHQ-7 were originally intended for primary care settings; however, they have become widely utilized based on their specificity and sensitivity.

## Method

### *Participants*

In all, 66 individuals participated in the study. These persons were tested in the LHAS within the 8-month period prior to hurricane Katrina (January 18 to August 23, 2005). We partitioned this sample to represent three age groups. Middle-age adults were between the ages of 45 to 64 years ( $n = 20$ ;  $M = 53.9$  years,  $SD = 5.9$  years, 13 males, 7 females). The young-old group were between the ages of 65 to 84 years ( $n = 20$ ;  $M = 73.8$  years,  $SD = 7.2$  years, 9 males, 11 females). The oldest-old group were 90 years of age and older ( $n = 26$ ;  $M = 92.0$  years,  $SD = 1.3$  years, 12 males, 14 females). All scored at least a 25 or higher on the MMSE (Folstein, Folstein, & McHugh, 1975) at the time of original testing and were free of neurologic impairment due to stroke or adult dementia. On average, approximately 4 to 6 months had elapsed between initial testing in the LHAS study proper and participation in this study. The mean number of days that had elapsed from pre- to posthurricane testing was 132.3 for the middle age adults, 157.7 for the young old adults, and 178.7 for the oldest-old adults. All were paid \$20 each in exchange for their voluntary participation.

### *Procedure*

Persons who were tested in the LHAS within the 8-month period prior to the storm were contacted by letter for the hurricane follow-up assessment. Those who agreed to participate were tested in their home or in the laboratory at Louisiana State University. Participants were tested individually across two sessions that lasted approximately an hour to 1 hour and 30 minutes each. Younger participants were tested in a single session, if desired. The same invariant order of administration was used across the single and two session formats. On the first day, informed consent was obtained and the cognitive measures, short demographic questionnaire, GDS, personality measure, and LHAS storm impact questionnaire (structured) were administered. Next, participants were given a list of six open-ended questions to read during a break period for those tested in a single session and to take home and consider for those tested across two sessions. On the second day (or second half of a single session), the open-ended LHAS storm impact questionnaire was administered. Participants' responses were tape recorded to ensure accuracy in data scoring. Next, the SF-36 (health-related quality of life), PHQ-9 (depression), PHQ-7 (anxiety), and the PCL (posttraumatic stress disorder) were given. Debriefing followed.

## Results and Discussion

### *Analyses of LHAS Storm Questionnaire*

Table 31.1 presents the frequency and percentage of LHAS participants who evacuated from their place of residence for the hurricanes as an index of storm impact. We included LHAS participants' family members and close friends' evacuation status on the assumption that how a person's family and close friends fared in the storms would have a direct bearing on the participant's psychological state and general sense of well-being in the postdisaster period.

Inspection of Table 31.1 reveals three noteworthy trends: First, the majority of the LHAS participants (88%) did not evacuate from their place of residence. In fact, not one of the young-old adults evacuated. This finding is not surprising because the LHAS study sample resides within a 40-mile radius of Baton Rouge, away from the devastated Gulf Coast region. These data also imply that most were storm-experienced and perhaps accustomed to "riding out the storm," which is fundamental to the culture of South Louisiana. Second, more than half of the participants in each age group had family and/or close friends who evacuated for Katrina. A smaller percentage mentioned family/friends who evacuated for Rita or for both hurricanes. The third interesting observation is that the oldest-old adults had proportionately more family/friends who evacuated for the hurricanes compared to the other age groups. As a result, we might expect them to be more vulnerable than the younger reference groups due to the greater number of family/close friends who were directly affected. Based on these outcomes, the inference that LHAS participants were not affected by the storms seems unwarranted. Perhaps a more conservative conclusion to draw is that LHAS participants were indirectly affected by the storms and for some, their experiences in the postdisaster period may have been influenced by the plight of their family and close friends.

### *Analyses of LHAS Individual Difference Measures*

Means for the self-perceived health and health-related quality of life measures appear in Table 31.2. Overall, participants' responses indicated a positive appraisal

**Table 31.1** Evacuation Status of LHAS Participants and Their Family and Friends

Age group	Katrina		Rita		Both Storms		Neither Storm	
	N	%	N	%	N	%	N	%
<b>Middle age (45 to 64 years)</b>								
Self	2	0.10	0	0.00	1	0.05	17	0.85
Family/friends	11	0.55	1	0.05	2	0.10	8	0.40
<b>Young-old (65 to 89 years)</b>								
Self	0	0.00	0	0.00	0	0.00	20	1.0
Family/friends	10	0.50	2	0.10	1	0.05	8	0.40
<b>Oldest-old (90 + years)</b>								
Self	2	0.10	0	0.00	3	0.12	21	0.81
Family/friends	17	0.65	1	0.04	5	0.19	8	0.31

**Table 31.2 Self-Perceived Health and Health-Related Quality of Life before and after the Storms**

	Pre-Hurricane Katrina/Rita		Post-Hurricane Katrina/Rita	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Health at the Present Time (1 = Excellent to 4 = Poor)<sup>a</sup></b>				
Middle age	1.95	0.60	1.90	0.64
Young-old	1.60	0.68	1.80	0.62
Oldest-old adults	1.85	0.73	2.00	0.57
<b>Health Prevents Activities (1 = Not at all to 3 = A great deal)<sup>a</sup></b>				
Middle age	1.55	0.69	1.50	0.61
Young-old	1.55	0.51	1.60	0.68
Oldest-old adults	1.50	0.71	1.88	0.77
<b>Health Compared to Others (1 = Better to 3 = Poorer)<sup>a</sup></b>				
Middle age	1.70	0.73	1.45	0.60
Young-old	1.15	0.37	1.20	0.41
Oldest-old adults	1.12	0.43	1.00	0.00
<b>Geriatric Depression Scale (GDS)<sup>b</sup></b>				
Middle age	1.05	1.28	1.30	1.22
Young-old	0.95	1.15	0.65	0.88
Oldest-old adults	1.73	1.73	1.65	1.52
<b>SF-36 Physical Health Composite Score (PCS)<sup>c</sup></b>				
Middle age	48.44	11.16	47.19	8.26
Young-old	48.20	8.29	46.67	7.82
Oldest-old adults	44.11	8.97	45.22	10.52
<b>SF-36 Mental Health Composite Score (MCS)<sup>c</sup></b>				
Middle age	55.17	5.06	57.49	3.35
Young-old	57.72	6.44	57.55	5.37
Oldest-old adults	58.40	5.03	56.20	7.10

<sup>a</sup>On a 4-point Likert scale.

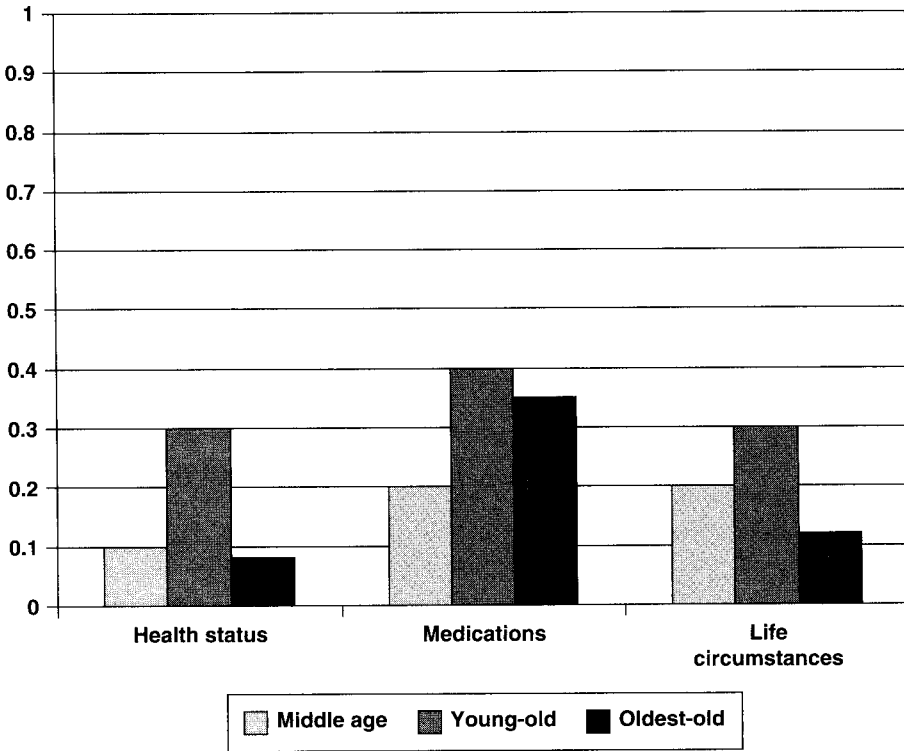
<sup>b</sup>From "Geriatric Depression Scale (GDS): Recent Evidence and Development of a Shorter Version" (pp. 165–173), by J. L. Sheikh and J. A. Yesavage, in *Clinical Gerontology: A Guide to Assessment and Intervention*, T. L. Brink (Ed.), 1986, New York: Haworth Press.

<sup>c</sup>From "The MOS 36 Item Short-Form Health Survey (SF-36): Pt. I. Conceptual Framework and Item Selection," by J. E. Ware and C. D. Sherbourne, 1992, *Medical Care*, 30, pp. 473–483.

of subjective health. Analyses of the ratings for health at the present time and health prevents activities yielded no significant effects ( $p$ 's > .10). For health compared to others, the age group main effect was significant,  $F(2, 63) = 10.64$ ,  $MSe = 0.30$ ,  $p < .001$ , owing to the middle age adults who rated their health compared to their age mates ( $M = 1.58$ ) less favorably than did the young-old ( $M = 1.18$ ) and oldest-old adults ( $M = 1.06$ ) who rated their health as better than their age mates, a nonsignificant difference. Importantly, there were no significant time of testing effects in these analyses of self-rated health, confirming that the hurricanes had no appreciable effect of LHAS participants' self-rated health.

Figure 31.1 presents the proportion of persons in each age group who reported experiencing a change in health status, medications, and life circumstances at posthurricane assessment relative to their initial testing. Analyses yielded a marginally significant age effect for health status,  $F(2, 63) = 2.56$ ,  $MSe = 0.13$ ,  $p = .09$ ,



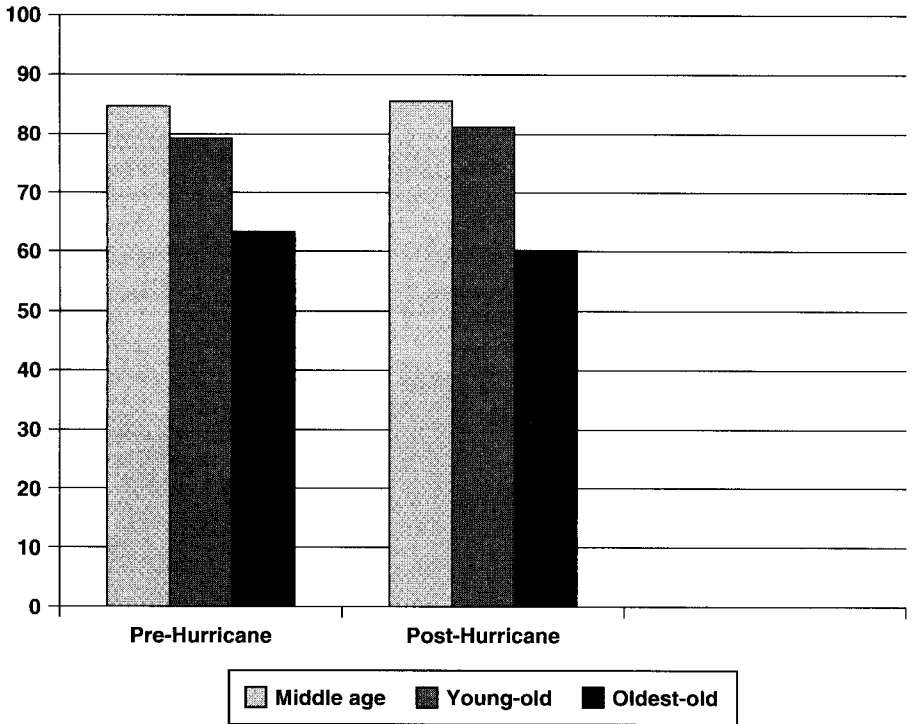


**Figure 31.1** Self-reported changes in health status, medications, and life circumstances.

owing to the young-old adults who reported greater changes compared to the middle age and oldest-old adults during the pre- to posthurricane assessment period (see Figure 31.1). There were no significant differences for changes in medications and life circumstances (all  $p$ 's < .29). In sum, our findings for the self-reported health questions imply that these participants were resilient to the effects of the hurricanes.

Participant's scores on the GDS revealed that the majority (all but one nonagenarian at pretest) were within the normal range and did not appear to be suffering from depression at the time of testing (see Table 31.2). Analyses of the GDS scores yielded a significant age-group effect,  $F(2, 63) = 3.05, p = .05$ , favoring the oldest-old adults whose mean GDS score was higher (1.69) than the middle age (1.18) and young-old age groups (0.80). Mean scores for all were all below the cutoff score of 6 that is considered indicative of mild depression on the GDS, however.

Analyses of the SF-36 composite scores yielded nonsignificant effects of age group and time of testing for the physical composite score (PCS) and the mental composite score (MCS; all  $p$ 's > .35). Given these null outcomes, we reran these analyses with gender as a factor, collapsing across age group. The results yielded the same pattern of nonsignificant effects (all  $p$ 's > .24). Next, we conducted a multivariate analysis of variance (MANOVA) on the eight subscale scores with age group and time of test as factors which yielded a significant main effect of age



**Figure 31.2** Physical function subscale scores on the SF-36 by age group and time of testing.

group ( $p = .03$ ). Follow-up univariate analyses of variance confirmed a significant age group effect for the physical functioning scale in both in the pre-HK/R scores,  $F(2, 60) = 5.60, p = .006$ , and the post-HK/R scores,  $F(2, 60) = 7.38, p = .001$ . Figure 31.2 presents the mean physical function scores by age group and time of testing. Physical functioning scores were highest for the middle-age adults who did not differ from the young-old adults, and both were significantly greater than the oldest old adults ( $p$ 's  $< .02$ ; see Figure 31.2).

### *Analyses of Mental Health Measures*

Table 31.3 presents the outcomes of the mental health measures new to the LHAS protocol. Interestingly, no one in the sample met the clinical criterion for a diagnosis of PTSD. The PTSD Checklist total scores ranged from 17 to 29 ( $M = 20.88, SD = 3.33$ ). Only one person met the criterion for major depression. Regarding depression severity, 78.79% of the sample were considered minimal, 19.70% were mild and only 1.52% (one person) was considered moderately depressed. The PHQ-9 Depression total scores ranged from 0 to 10 ( $M = 2.30, SD = 2.55$ ). Inspection of Table 31.3 further reveals that no one in the sample met the clinical criterion for generalized anxiety disorder. The PHQ-7 Generalized Anxiety Disorder total scores ranged from 0 to 8 ( $M = 2.48, SD = 2.17$ ). Together, the outcomes of these mental health measures suggest that possible psychological distress due to

**Table 31.3 Mental Health Characteristics of the Sample**

Characteristics	<i>N</i>	Percent
Total	66	
<b>Posttraumatic Stress Disorder</b>		
–No	66	100.00
–Yes	0	0.00
<b>Major Depression</b>		
–No	65	98.48
–Yes	1	1.52
<b>Severity of Depression</b>		
–Minimal (0–4)	52	78.79
–Mild (5–9)	13	19.70
–Moderate (10–14)	1	1.52
–Moderately severe (15–19)	0	0.00
–Severe (20–27)	0	0.00
<b>Generalized Anxiety Disorder</b>		
–No	66	100.00
–Yes	0	0.00

the storms and their aftermath was minimal, further attesting to the resiliency of the LHAS participants.

We included these mental health measures to provide a broader assessment of postdisaster health outcomes and psychological well-being than would be possible had we only included the LHAS self-reported health measures. Our findings of minimal mental health problems in the postdisaster period compliment those of Melick and Logue (1985–1986) who found no evidence of elevated anxiety and depression in a sample of elderly flood victims compared to a nonvictim sample. Overall, our findings are consistent with the inoculation hypothesis, underscoring the positive role of prior life experience in adapting to postdisaster life circumstances.

### Clinical Implications

We found minimal pre- to post-HK/R differences for most of the LHAS individual difference variables, including self-reported health, affective status (GDS) and health-related quality of life (SF-36). On a broader note, the nonsignificant age group differences observed for 7 of the 8 SF-36 subscale scores are compatible with previous findings demonstrating that quality of life does not necessarily decline with age (e.g., Sarvimäki & Stenbock-Hult, 2000). Many factors may ultimately contribute to an individual's general sense of well-being and quality of life. For instance, marital status, higher education level, higher socioeconomic status, better functional capacity, adequate quality of housing, the presence of meaningful social relationships, and certain personality traits have all been suggested to positively influence quality of life (Sarvimäki & Stenbock-Hult, 2000) and self-ratings of successful aging (Montross et al., 2006). Future research to examine the protective effects of general well-being and quality of life on posthurricane psychological reactions seems warranted.

An important lesson learned in this research is that persons who self-select as volunteers in a population-based study of healthy aging may be especially high functioning to begin with. The finding that the hurricanes appeared to have relatively little influence on the dimensions of self-reported health, health-related quality of life, and other LHAS dependent measures may be a reflection of selectivity in the direction of successful aging. The LHAS study sample may include those people who are more likely to survive, adapt and overcome adversity, and handle environmental stressors well, which limits the generalizability of these findings. Additionally, it should be noted that the storm-related environmental stressors for people in the greater Baton Rouge area were largely confined to loss of power that resulted in cold water for bathing, no air conditioning, spoiled food, and other inconveniences, as well as limited access to resources outside of the home due to gasoline shortages, increased traffic, and other discomforts. Conceivably, a different pattern of outcomes would have been obtained in this study had the LHAS participants lived in the hardest hit parishes in South Louisiana, including Calcasieu, Cameron, Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, and St. Tammany parishes. These considerations notwithstanding, the nonsignificant differences found for the pre- and post-HK/R individual difference measures are certainly good news for the LHAS from a quality control perspective. That is, there appears to be little evidence to imply that Hurricanes Katrina and Rita constitute an indelible period effect that would compromise subsequent measurements in the LHAS study sample.

## SUMMARY

In this chapter, we suggested that natural disasters provide an effective context for studying successful aging and resiliency in the face of a significant environmental stressor. Results from the LHAS hurricane study confirm this view and provide an initial glimpse into the impact of a natural disaster of wind and water on the oldest-old. Our findings provide new evidence of resiliency in the wake of hurricanes Katrina and Rita in this study sample. Future directions for the LHAS hurricane study include an assessment of changes in participants' responses over time in a second wave of testing that spans the time frame from 6 to 14 months after the storms. In Wave 2 testing, we hope to provide a more in-depth examination of religious coping with the inclusion of a new structured questionnaire and the addition of a religious coping item to the open-ended questionnaire. We suspect that our participants may have used positive coping strategies, such as talking with a confidant, using prayer, and finding a silver lining, an exciting possibility that awaits empirical confirmation. Additionally, we include LHAS participants in their 20s and 30s in Wave 2 testing to provide a broader depiction of life course differences in posthurricane coping and resiliency.

With respect to practical implications, our population is aging and the increasing numbers of older adults in today's society brings many issues and challenges for individuals, families, and society as a whole. Difficulties with activities of daily living increase with age, as does the prevalence of chronic conditions such as arthritis, hypertension, hearing impairment, heart disease, and cataracts, among others (Administration on Aging, 2001). Older persons are therefore at greater risk for chronic

illnesses and functional disability relative to younger persons (Karel, 1997). While people age 65 and older may have more health problems than younger adults, most cope with the obstacles and difficulties of aging and find joy in their lives, despite the changing life circumstances that occur with aging (Baltes & Baltes, 1990). Rowe and Kahn (1997) have defined successful aging as avoiding disease and disability, maintaining high levels of physical and cognitive functioning, and remaining engaged in social and productive activities. Disability prevention, maintaining quality of life, and promoting healthy aging are critical themes for psychologists to remember as we move into the twenty-first century.

In closing, we offer a few practical suggestions for promoting successful aging in late adulthood. First, the health benefits of proper diet, nutrition, and exercise to well-being in later life are widely recognized today. Moderate exercise, such as walking or participating in fitness programs, may help with stress reduction and can enhance mental health (U.S. Department of Health and Human Services, 1996). Physical activity in the form of regular exercise has also been shown to positively correlate with cognitive function (Clarkson-Smith & Hartley, 1989). Additionally, social relationships and intellectual activities can promote successful aging and enhance quality of life as we age. There are many benefits of having supportive family members and friends. Having a wide network of different types of friends increases the variety of skills and resources that friends can bring to bear when an older person needs help or support. Family and friends can provide companionship, as well as social and emotional support, which is important for psychological well-being (Adams & Blieszner, 1995). Friends are generally considered more important to the psychological well-being of older adults than are family members (Antonucci & Akiyama, 1995). This trend is probably related to the fact that older people are more likely to confide in age-peers, and there is a greater likelihood of friends involving the older person with the larger society (Adams & Blieszner, 1995).

Finally, the positive effects of pursuing leisure activities in promoting successful aging should not be overlooked. Leisure activities can take many forms, such as religious affiliation and participation in church activities, volunteering in local community organizations, spending time with family and friends, and traveling. Pursuing leisure interests is a very important part of "aging well." As a final thought, remember the adage that successful aging is not the absence of cognitive change, but adaptation to change (see Cherry & Smith, 1998, for discussion). Adaptation and coping to changes in later adulthood can take many forms, including modifying the environment to adapt to physical changes, drawing strength from family and friends, and cultivating optimism, a positive outlook, and hope (P. B. Baltes & Baltes, 1990).

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