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THE ROLE OF STRESSFUL LIFE EVENTS

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INTRODUCTION

"November 11, 2000, Salzburg, Austria: Around 170 people, mostly children and youths, are believed to have been killed when a blaze erupted on a cable train in the Austrian Alps. Rescuers at the scene of the inferno in the province of Salzburg say there is "no hope of any more survivors" after just a handful of people out of an estimated 180 passengers escaped alive." (*CNN online*)

The tragedy in Austria reported by CNN left behind hundreds of relatives and friends of the victims devastated and mourning over the loss of their loved ones. Some of the mourners might never fully recover from the shock and the pain, others might be able to return to the lives they were living before the event had occurred. Among those affected are also the few survivors, whose lives will probably never be the same, and the rescue personnel. Although those affected by the tragedy may have similar first responses, namely shock, disbelief, and numbness, the specific impact on each individual may be different. Some have lost a child or spouse, others have faced death in the tunnel inferno. Unfortunately, major accidents such as fires, airplane crashes, or gas explosions, just to name a few, happen quite frequently in industrial societies. Nevertheless, they take most people by surprise, require major readjustment efforts, and alter the course of their biographies. Some experiences may have a long-lasting impact on a person's mental and physical health, while others exert only a short-term influence.

We will start this chapter with a brief overview of theoretical concepts and critical issues related to stressful life event research and will discuss some characteristics of major events and disasters, and the attempts to measure the unique ways how people experience them. We will also present some empirical findings on the relationship between specific life events and health impairments. Examples are drawn from a variety of natural and technological disasters, war, bereavement, criminal victimization, and migration. Not included in this chapter are those health effects that might be due to individual differences in personality, coping, and social support.

Life events and coping are inevitably intertwined. In many studies, coping has been identified as a mediating link between stress and imminent health outcomes (cf. chapter on coping). In spite of this necessary omission, we believe that a useful overview of life events has been provided.

STRESS AND CRITICAL LIFE EVENTS: THEORETICAL PERSPECTIVES

There is no agreement among researchers about the definition of stress. In the biomedical sciences, stress is mainly understood as an organism's response to adverse stimulation. In psychology, stress is usually understood as the process where a person and the environment interact. Sometimes the nature of the stressor is the focus of research. In health psychology, joint effects of the person and environment on pathology are studied, along with mediating and moderating factors, such as coping and social support (Hobfoll, Schwarzer, & Chon, 1998). Basically, three broad perspectives can be chosen when studying stress: (a) the response-based perspective, (b) the stimulus-based perspective, and (c) the cognitive-transactional process perspective. We will briefly address this distinction in order to provide a better understanding of the role of stressful life events.

The Response-Based Perspective

When people say, “I feel a lot of stress,” they refer to their response to some adverse situation. The focus is on the way their organism reacts. Selye (1956) has distinguished between a stressor (the stimulus) and stress (the response). Selye was not interested in the nature of the stressor, but rather in the physiological response and the development of illness. This response to a stimulus follows the same typical three-stage pattern in men and animals, called the general adaptation syndrome (GAS). According to GAS, the body initially defends itself against adverse circumstances by the activating the sympathetic nervous system. This has been called the *alarm reaction*. It mobilizes the body for the “fight or flight” response, which can be seen phylogenetically as an adaptive short-term reaction to emergency situations. In many cases, the stress episode is mastered during the alarm reaction stage.

Often, however, stress is a longer encounter, and the organism moves on to the *resistance stage,* in which it adapts more or less successfully to the stressor. Although the person does not make the impression of being under stress, the organism does not function well and becomes ill. According to Selye, the immune system is compromised, and some typical “diseases of adaptation” develop under persistent stress, such as ulcers and cardiovascular diseases.

Finally, in the *exhaustion stage*, the organism’s adaptation resources are depleted, and a breakdown occurs,. This is associated with parasympathetic activation that leads to illness, burnout, depression, or even death.

This response-based perspective of stress has some merits, and it is still dominant in the biomedical sciences, but not in psychology.. The main reason that it is no longer supported in psychology is that Selye has neglected the role of emotions and cognitions by focusing solely on physiological reactions in animals, including humans. Selye claimed that all these organisms show a nonspecific response to adverse stimulations, no matter what the situation looks like. In contrast, modern psychological theories highlight the individual’s interpretation of the situation as a major determinant of a stressful encounter.

The Stimulus-Based Perspective

When someone says, "I have a stressful marriage," they refer to a trying situation, not to their response to that situation. The stimulus-based perspective takes this approach, paying more attention to the particular characteristics of the stressor. It is argued that each critical episode has its unique demands, be it physical, social, role, or task, that specifically tax the individual's coping resources, thus triggering a particular stress response. The research question establishes relationships between a variety of distinct stressors and outcomes, including illness.

This line of research emerged when Holmes and Rahe (1967) attempted to measure life stress by assigning numbers, called life-change units, to 43 critical life events (see below). They assumed that the average amount of adaptive effort necessary to cope with an event would be a useful indicator of the severeness of such an event. A volume subsequently edited by B. S. Dohrenwend and Dohrenwend (1974) was another milestone of the stimulus-based perspective of stress. Today, research in this tradition continues, but it is often flawed by a number of problems. One basic shortcoming is the use of average weights for events, neglecting that different individuals may have a very different perception of the same kind of event. Also, studies rely too often on retrospective reports of previous challenges that might not be remembered well, or that are distorted as a result of defense mechanisms. In addition, coping processes and changes in social support are often insufficiently examined. The degree to which the objective nature of the stressor should be emphasized in contrast to its subjective interpretation is still undergoing debate (Hobfoll, 1998; Schwarzer, 2001).

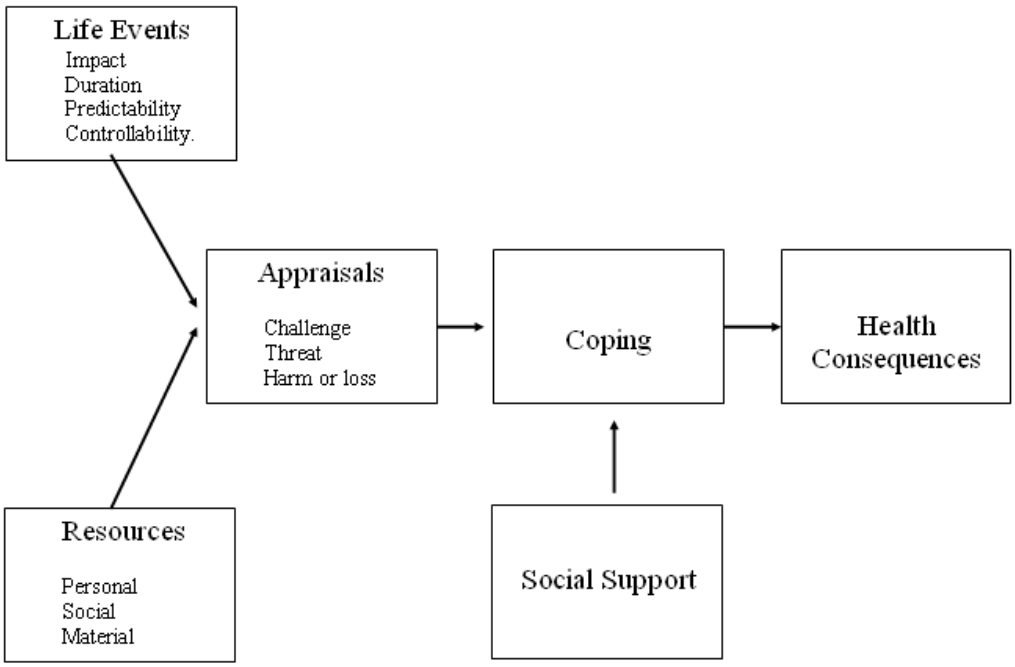
The Cognitive-Transactional Process Perspective

Cognitive-transactional theory (Lazarus, 1966, 1991) defines stress as a particular relationship between the person and the environment that is appraised by the person as being taxing or exceeding his or her resources and endangering his or her well-being.

There are three metatheoretical assumptions: *transaction*, *process*, and *context*. It is assumed that (a) stress occurs as a specific encounter of the person with the environment, both of them exerting a reciprocal influence on each other, (b) stress is subject to continuous change, and (c) the meaning of a particular transaction is derived from the underlying context. Research has neglected these metatheoretical assumptions in favor of unidirectional, cross-sectional, and context-free designs. Within methodologically sound empirical research, it is hardly possible to study complex phenomena such as emotions and coping without constraints. Also, on account of its complexity and transactional character leading to interdependencies between the variables involved, the metatheoretical system approach cannot be investigated and empirically tested as a whole model. Rather, it represents a heuristic framework that may serve to formulate and test hypotheses in selected subareas of the theoretical system only. Thus, in terms of the ideal research paradigm, one has to make certain concessions. Investigators have often focused on structure instead of process, measuring single states or aggregates of states. Ideally, however, stress has to be analyzed and investigated as an *active, unfolding process*.

Lazarus (1991) conceives stress as an active, unfolding process that is composed of causal antecedents, mediating processes, and effects. *Antecedents* are person variables, such as commitments or beliefs, and environmental variables, such as demands or situational constraints. *Mediating processes* refer to coping and appraisals of demands and resources. Experiencing stress and coping bring about both immediate effects, such as affect or physiological changes, and long-term effects concerning psychological well-being, somatic health, and social functioning (see Figure 1).

Figure 1. Process Model of the Stress/Health Relationship, based on the Transactional Stress Theory by Lazarus (1991).



Cognitive appraisals comprise two component processes, namely primary (demand) appraisals and secondary (resource) appraisals. Appraisal outcomes are divided into the categories challenge, threat, and harm/loss. First, *demand appraisal* refers to the stakes a person has in a stressful encounter. A situation is appraised as challenging when it mobilizes physical and mental activity and involvement. In the evaluation of *challenge*, a person may see an opportunity to prove herself or himself, anticipating gain, mastery, or personal growth from the venture. The situation is experienced as pleasant, exciting, and interesting, and the person feels ardent and confident in being able to meet the demands. *Threat* occurs when the individual perceives danger, expecting physical injuries or blows to one's self-esteem. In the experience of *harm/loss*, damage has already occurred. This can be the injury or loss of valued persons, important objects, self-worth, or social standing.

Second, *resource appraisals* refer to one's available coping options for dealing with the demands at hand. The individual evaluates his or her competence, social support, and material or other resources that can help to readapt to the circumstances and to re-establish equilibrium between person and environment.

Hobfoll (1988, 1998, in press) has expanded stress and coping theory with respect to the conservation of resources as the main human motive in the struggle with stressful encounters. His conservation of resources (COR) theory provides an integrative framework for studying stress that takes environmental as well as internal processes equally into account.

COR theory follows from the basic motivational tenet that people strive to obtain, retain, protect, and foster that which they value or that serve as a means of obtaining what is valued by the individual. According to Hobfoll, such resources are objects (e.g., property, car), conditions (e.g., close friendship, marriage, job security), personal characteristics (e.g., self-esteem, mastery), or energies (e.g., money, knowledge). Stress occurs in any of three contexts: (a) when individuals' resources are threatened with loss, (b) when individuals' resources are actually lost, and (c) when individuals fail to gain resources. This loss/gain dichotomy, and in particular the resource-based loss spirals and gain spirals, shed a new light on stress and coping. The *change* of resources (more so the loss than the gain) appears to be particularly stressful, whereas the mere lack of resources or their availability seems to be less influential.

Resources were also an important ingredient in Lazarus' theory. The difference between the two views lies mainly in the status of *objective and subjective resources*. Hobfoll,

considering both objective and subjective resources as components, lends more weight to objective resources. Thus, the difference between the two theories, in this respect, is a matter of degree, not a matter of principle.

THE NATURE OF STRESSFUL LIFE EVENTS AND DISASTERS

Characteristics of Life Events and Disasters

Disasters of various kinds are widespread. About 3 million people worldwide have been killed and 800 million aversely affected by natural disasters and other calamities over the past two decades (Weisaeth, 1992). In the United States, fire, floods, hurricanes, tornadoes, severe tropical storms or windstorms, and earthquakes have left behind approximately 2 million households with physical damage and injuries (S. D. Solomon & Green, 1992). Injuries and damages from fires, floods, storms, and earthquakes are estimated to be experienced by 24.5 households per 1,000 (Briere & Elliot, 2000; Rossi, Wright, Weber-Burdin, & Perina, 1983).

Historically speaking, research on health effects of stressful life events commenced with clinical records of individual reactions to war. Following the American Civil War and World War I, shell shock and battle fatigue became known as extreme reactions to this kind of stress. After World War II, studies on the long-term effects of the Holocaust and other war-related events, such as the devastation of Hiroshima, were conducted. Disasters unrelated to war have been investigated by psychologists since the 1970s. At present, a broad variety of disasters, ranging from tornadoes and floods to fire and toxic spills, are being examined for their health impact on individuals and communities. A comprehensive overview of disaster characteristics and postdisaster response is given by Meichenbaum (1995) and Schooler (in press). A cataclysmic event qualifies as a disaster according to the amount of damage done and the amount of assistance required. The power of the event alone is inadequate: A powerful earthquake in a desert may not be considered as a disaster, whereas one of the same magnitude in a city would qualify because of the resulting substantial damage. In addition to harm sustained, considerable disruption to people's lives can also factor into the definition of disaster. Disasters represent one of the most threatening situations a person can experience (Schooler, in press).

The present section deals with distinctions that have been applied to characteristics of life events and disasters. Objective characteristics of a stressful encounter influence the way people appraise them cognitively as challenges, threat, harm, or loss. Severity, duration, and ambiguity of a stressor, among other characteristics, make a difference when it comes to appraisal, emotions, coping, and outcomes. Loss of loved ones, academic failure, injury, job loss, divorce, and disasters that affect an entire community can be categorized along a number of dimensions, including predictability, controllability, suddenness, and strength of impact, etc. A common distinction is the one between normative and non-normative events. Normative refers to anticipating a certain class of events that naturally happen to many individuals at certain times during their lives and are expected, for example school transitions, marriage, childbirth, academic exams, retirement, death of parents and others. In contrast, non-normative events pertain to rare or unexpected events, such as disasters, accidents, or diseases. One can prepare in general for a broad array of potential harm, but one does not know when and if such events will occur.

Natural and Technological Disasters

Another common distinction is between natural and technological disasters. *Natural disasters* occur primarily without human influence. Typical examples are hurricanes, tornadoes, earthquakes, and floods, but also drought and famine. Humans may have

contributed to the likelihood of certain cataclysmic events by changing the course of nature, for example by cutting down forests and allowing landscapes to erode. However, natural forces crop up suddenly and uncontrolled, take lives, and alter the environment dramatically. "Natural disasters vary widely in predictability and impact. Earthquakes are virtually unpredictable, whereas hurricanes can be tracked for days before they hit land. However, consequences such as the extent of physical destruction and disruption of daily life often take victims by surprise, even after the more predictable types of events. Months of cleaning and rebuilding can follow initial rescue work and recovery of human remains. Moreover, drawn-out and complicated insurance, litigation, and financial issues may compound adjustment difficulties following disasters" (Schooler, in press).

Technological disasters can also be sudden and intense, creating havoc in the community. Devastating industrial, maritime, and aviation accidents may take place without warning. Examples include leaking toxic waste dumps, collapsing bridges, and dam failures, but also industrial accidents involving chemical spills or discharge of radiation. "With increasingly widespread prevalence of technological systems there will inevitably be an increase in the potential for loss of control over these systems" (Schooler, in press).

Controllability

Perceived controllability is considered to be an important dimension when it comes to categorizing the characteristics of stressful life events. The feeling of being in control of something that happens to oneself has been shown to be important for coping with that event. Further, a sudden versus a slow onset, its duration, and its intensity are major determinants in evaluating the stress impact. Natural disasters point toward a *lack* of control over the environment, whereas technological disasters indicate a *loss* of control of what has been once under control. A major supposition underlying our dependence on technological systems is that they won't break down. That is, bridges and dams are supposed to resist all forces of nature, and airplanes and trains are not supposed to crash. Deviations from this supposition contribute to the harm experienced by victims and witnesses when disaster strikes unexpectedly and uncontrolled. "In the case of technological disasters, an implicit social contract between citizens and corporations is violated. The assumption is that corporations will not harm their customers, workers, or members of the community where they make their products. When this contract is violated, anger and rage are added to the range of emotional responses to disasters" (Schooler, in press). Another way to conceptualize disasters was suggested by Green (1998), who pointed to the role of perceived intent. Natural disasters represent the low end of a continuum of intent, technological disasters the middle position, and robbery, terrorist attacks, and other acts of violence the high end.

Impact of Disasters

Responses to extreme stress vary greatly in severity and length. Some individuals and communities are paralyzed for a long time, whereas others are affected only moderately and for a very short time period. When high magnitude events occur, not only the individual, but also whole communities are challenged to cope with them. Figley, Giel, Borgo, Briggs, and Haritos-Fatouros (1995) list *five criteria* for the determination of a disaster's impact: (a) knowledge about the magnitude of loss, (b) knowledge of the hazard, (c) knowledge of recurring risk, degree of warning and preparedness at the individual as well as at the community level, (d) scope of impact to community functioning, and, finally, (e) chance of escaping during or immediately after the disaster strikes.

Victims of Disasters

Another relevant dimension pertains to the *victims of disasters*. Considerable differences in the exposure to the event (long- or short-term, first- or secondhand, that is, having experienced the event themselves instead of through close friends and family) determine the individuals' responses (e.g., severity of symptoms postevent). Some victims are involved directly because the critical event happened to them, and they have suffered harm or loss. Others are involved indirectly; for example, observing a train collision or losing family members in an earthquake or plane crash. A third kind of victims are professional helpers, such as rescue workers who are involved in the cleanup and body handling after a disastrous event.

Posttraumatic Stress Disorder (PTSD)

A frequent effect of disaster experience is posttraumatic stress disorder (PTSD). It is usually defined as a pattern of symptoms following exposure to a stressful life event that sets off clinically significant distress or impairment of human functioning. The concept has been described in different terms in former times, in particular in the context of railway accidents in the 19th century and as shell shock during World War I. At that time, 7-10% of the officers and 3-4% of the other ranks in the British Army were diagnosed with mental breakdowns. In World War II, mental disorder accounted for 31% of medical discharges from the British Army. Of all US Vietnam veterans, an estimated 15% (450,000) were diagnosed with posttraumatic stress disorder (Newman, in press).

Diagnostic criteria for PTSD are provided in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). According to this manual, PTSD may follow exposure to a traumatic event that the person experienced, witnessed or was confronted with. Such an incident may have involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others. The individual should have reacted with intense fear, helplessness, or horror. To be diagnosed as a PTSD case, the person should be persistently reexperiencing the traumatic event, such as living through repetitive and intrusive distressing recollections of the event, experiencing incessant upsetting dreams of the incident, acting or feeling as if the incident was recurring, suffering intense distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event, or being subjected to physiological reactivity on exposure to such cues. There should be evidence of continuing avoidance of trauma-related stimuli and numbing of general responsiveness (not present before the trauma), as indicated by three or more of the following: efforts to avoid thoughts, feelings, or conversations connected with the trauma, efforts to avoid activities, places or people that arouse recollections of the trauma, failure to recall an important aspect of the trauma, markedly diminished interest or participation in significant activities, a feeling of detachment or estrangement from others, restricted range of emotions, sense of a foreshortened future. There should also be at least two persistent symptoms of increased arousal (not present before the trauma), such as difficulty falling or staying asleep, irritability or outbursts of anger, difficulty concentrating, hypervigilance, an exaggerated startle response. These symptoms should have persisted for at least one month, causing significant distress or impairment of functioning (Newman, in press).

Several measures have been developed to quantify aspects of PTSD. The Horowitz impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) is a 15-item self-rating scale with intrusion and avoidance as subscales. It provides a subjective estimate of the frequency of intrusive recall of a traumatic event and of attempts to avoid such recall. The inventory has been used frequently in research as a measure of postevent psychological disturbance, but it is not suitable to result in a clinical case definition according to the DSM standards. Closer to this aim is the scale by J. R. T. Davidson et al. (1997), who developed a 17-item self-rating scale for PTSD that was designed to measure each DSM-IV symptom on five-point frequency

and severity scales. There also are some measures for assessing PTSD in children, such as: (a) "Darryl" (Neugebauer et al., 1999); (b) the Child Posttraumatic Stress Reaction Index (Shannon, Lonigan, Finch, & Taylor, 1994); and (c) the Post-Traumatic Stress Disorder Reaction Index-Child Version (Pynoos et al., 1987).

ASSESSMENT OF STRESSFUL LIFE EVENTS

The main practical problem with transactional theories of stress is that there is no good way of measuring stress as a process. Therefore, all common procedures to assess stress are either dominantly stimulus-based, pointing at critical events and demands, or dominantly response-based, pointing at symptoms and feelings experienced. Some procedures measure the frequency or intensity of stressors (stimuli), while others measure distress (response), sometimes called "strain." Response-based measures that are available entail symptoms, emotions, illness, and behavioral and physiological changes. Heart rate, blood pressure, immune functioning, illness records, work absentee statistics, avoidance behaviors, performance data, and self-reports are common ways to obtain stress response indicators. Some authors have developed "perceived stress scales" that ask people how "stressed" they feel. Using such measures to tap the construct of stress can be misleading because individual changes in these variables occur at later stages of a demanding episode. Thus, stress is confounded with its consequences. One cannot clearly identify whether the subjective feeling constitutes stress itself or rather the outcome of stress. The present chapter is not concerned with stress as a response, and, therefore, this issue is not addressed further.

Stimulus-based instruments were developed more than forty years ago when Hawkins, Davies, and Holmes (1957) introduced their Schedule of Recent Experiences (SRE). A more refined and better-known instrument is the Social Readjustment Rating Scale (SRRS) by Holmes and Rahe (1967), who elaborated on the SRE. The SRRS contains 43 events that are listed in Table 1, together with their life-change value, ranging from 100 (death of spouse) to 11 (minor violations of the law).

Table 1
Social Readjustment Rating Scale (SRRS)

Rank	*Life Event*	*Mean Value*	*Rank*	*Life Event*	*Mean Value*
1.	Death of spouse	100	23.	Son or daughter leaving home	29
2.	Divorce	73	24.	Trouble with in-laws	29
3.	Martial separation	65	25.	Outstanding personal achievement	28
4.	Jail term	63	26.	Wife begins or stops work	26
5.	Death of close family member	63	27.	Begin or end school	26
6.	Personal injury or illness	53	28.	Change in living conditions	25
7.	Marriage	50	29.	Revision of personal habits	24
8.	Fired at work	47	30.	Trouble with boss	23
9.	Martial reconciliation	45	31.	Change in work hours or conditions	20
10.	Retirement	45	32.	Change in residence	20
11.	Change in health of family member	44	33.	Change in schools	20
12.	Pregnancy	40	34.	Change in recreation	19
13.	Sex difficulties	39	35.	Change in church activities	19
14.	Gain of new family member	39	36.	Change in social activities	18
15.	Business readjustment	39	37.	Mortgage or loan less than $ 10,000	17
16.	Change in financial state	38	38.	Change in sleeping habits	16
17.	Death of close friend	37	39.	Change in number of family get-togethers	15
18.	Change to different line of work	36	40.	Change in eating habits	15
19.	Change in number of arguments				

	with spouse	35	41.	Vacation	13
20.	Mortgage over $10,000	31	42.	Christmas	12
21.	Foreclosure of mortgage or loan	30	43.	Minor violations of the law	11
22.	Change in responsibilities at work	29			

SOURCE: From The Social Readjustment Rating Scale by T. H. Holmes and R. H. Rahe, 1967. *Journal of Psychosomatic Research, II*, p. 216.

Participants responding to the SRRS check the items they have experienced in the past, for example within the last year. The life-change values of the checked items are then summed up to yield a total score that indicates how much "stress" the individuals had. For example, someone who has experienced the loss of a loved one is supposed to suffer about as much stress as someone else who has married and has been fired at work within the same time period. Obviously, the same stress score can refer to completely different life events in different individuals, and it is questionable whether they should be regarded as psychologically equal and lumped together in the same analyses. The stress score is then usually related to mood, illness, depression, and other possible outcomes.

The underlying assumption was that the negative nature of events is not the important factor, but the amount of *change* that is required to readjust to a tolerable level of functioning. Therefore, some positive events have also been included in the checklist, such as vacation, Christmas, marriage, and pregnancy. Any change, whether desirable or not, was seen as stressful. Other researchers have eliminated the positive events in favor of more negative ones, and they have added a subjective severity rating for each event in order to weigh the cognitive appraisals that might differ from person to person (Sarason, Johnson, & Siegel, 1978).

There have been many debates about the usefulness and effectiveness of such an approach (Turner & Wheaton, 1995). Some find that assigning the same event weights to all individuals who check an item might not do justice to subjective feelings of stress that could differ enormously between individuals. For example, some people experience divorce as the beginning of a long period of suffering and depression, whereas for others it marks the endpoint of marital discord and is thus a relief. Event weighting could be done either objectively or subjectively. In the case of objective weighting, an expert panel of "judges" may rate the events, or groups of victims might provide information about the seriousness or importance of events. In contrast, subjective weighting refers to individuals rating their own events. Whichever method is chosen, assigning different weights to each event has been shown to result in lower correlations with health outcomes (Turner & Wheaton, 1995).

Another suggestion was made by Lazarus and Folkman (1989) by introducing the Daily Hassles Scale and the Daily Uplift Scale. These inventories are based on the assumption that peoples' lives are more affected by the cumulation of frequent minor events than by the rare occurrence of a major event. Typical hassles are concern about body weight, health of family members, rising prices of common goods, home maintenance, misplacing or losing items, crime, physical appearance, etc. It has been found that hassles and major life events were only modestly intercorrelated, and that hassles, compared to major life events, were more closely related to illness.

The *reliability* of life event checklists has been suspected to be low (Turner & Wheaton, 1995). Reporting past events requires an accurate recollection of those events. The measurement points in time and the reporting period exert one influence, among others, on how well people remember and report what has allegedly caused them stress. In a ten-month study, women were asked once every month to check all their stressful life events for that month. At the end of the study, they were asked to report once again all events for the entire ten-month period. It turned out that only 25% of the event categories appeared in both the first and the second lists, the latter containing far fewer events (Raphael, Cloitre, & Dohrenwend,

1991). Basic research on survey methods has shown that responses change with the reference periods given (Winkielman, Knäuper, & Schwarz, 1998). Such studies have demonstrated that life event checklists often represent unreliable measures. And if they are unreliable, they cannot be valid, which means that they inaccurately predict illness. The choice of a time frame entails consideration of the particular nature of the stressors. However, since checklists contain numerous events that might have occurred at different times under diverse circumstances, any time frame implies a bias. Moreover, some events are short-term, whereas others are long-term. The accuracy of remembering and reporting applies to a number of events, but not to all of them. For example, loss of loved ones, divorce, or serious accidents are remembered for a lifetime. Their psychological and health consequences can also last for an extended time period. Restricting the time frame of events to only one year might lead to failure to notice such previous experiences and, thus, might invalidate the research findings. This argues for the inclusion of lifetime traumas and the assessment of their duration and pervasiveness.

Interview measures that allow for qualitative probes have been used as an alternative to checklists (Wethington, Brown, & Kessler, 1995). Narrative stories can shed more light on the nature of subjective experiences (Meichenbaum, 1995). Individuals can name the events they experienced and describe their context more accurately, which would result in more meaningful scores of event significance. However, there is a price for this because interview studies entail more research resources. Moreover, quantification is sometimes difficult. Phrases such as “I am a prisoner of the past,” “part of me died,” or “the disaster opened a can of worms” are illustrative, but scoring them might constitute a problem. Nevertheless, in small sample studies and, in particular, in the explorative phase of research, the interview methodology can be of profound value. Several interview schedules have been published. The most widely known is the Life Events and Difficulties Schedule (LEDS) by Brown and Harris (1978). It yields a narrative story of each nominated event, which is then used by researchers to rate the significance of the event. Another method is the Standardized Event Rating System (SERATE) by B. P. Dohrenwend, Raphael, Schartz, Stueve, and Skodol (1993). This is a structured event probe and narrative rating method for measuring stressful life events that deconfounds some aspects of the narration.

In sum, a broad array of life event checklists and interview measures have been published. At least 20 critical reviews on the life event methodology are available (Turner & Wheaton, 1995) documenting the difficulties that are necessarily involved in estimating variations in stress exposure. Using a stress measure implies a particular definition of stress, which is not always transparent in the studies. Sometimes stress is not measured at all, but is merely inherent in the sample selection. For example, stress is simply implied in a sample of earthquake victims, students facing an exam, or patients undergoing surgery, since it is a common understanding that the situations chosen are very resource demanding and require adjustment. The advantage of such an approach is that all participants undergo a homogeneous class of stressors instead of having been assigned a similar “life-change score” based on an event checklist. In situations where exposure levels are given and no further assessment is needed, one still has to deal with the measurement of coping with stress, which is an equally challenging problem (Schwarzer & Schwarzer, 1996).

Health Outcomes of Stressful Life Events

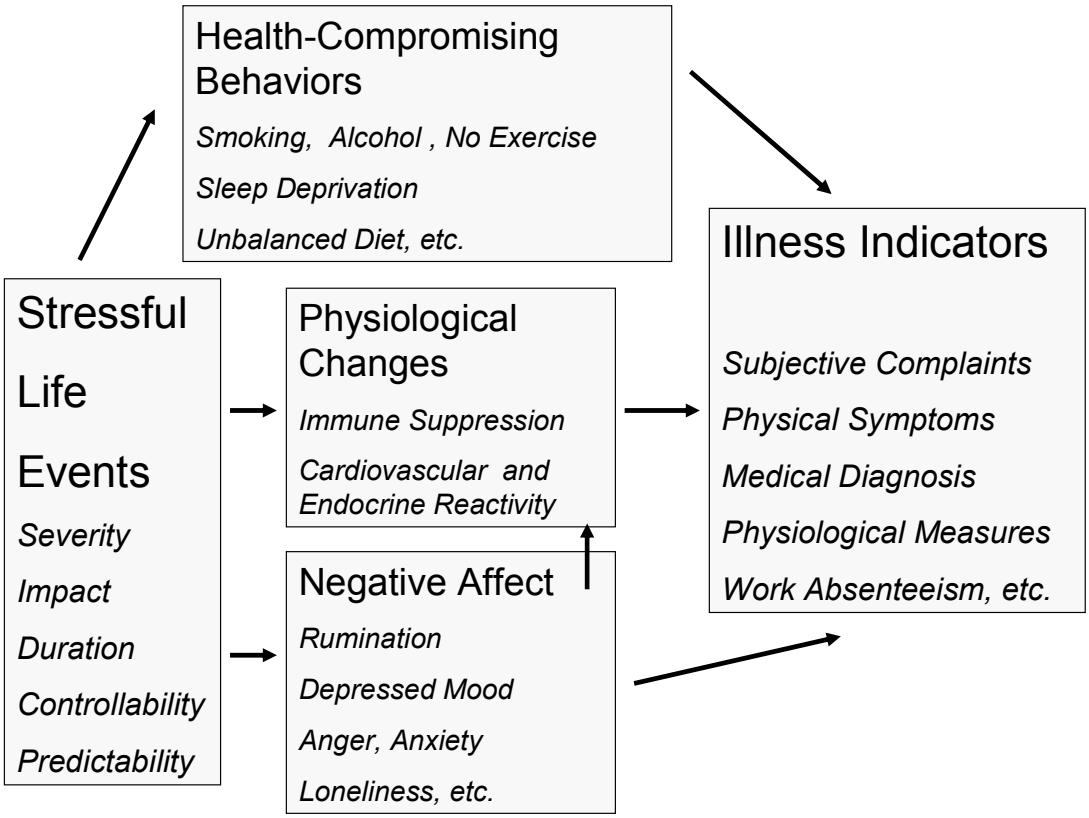
Does stress cause illness? Individuals are confronted with a great number of taxing situations, for instance a noisy neighborhood, difficulties at work, time pressure, problems with a romantic partner, or financial constraints. This list might seem to be an arbitrary array of situations. In fact, probably not everyone would consider these situations as being stressful or of great personal importance. However, the cumulative exposure to a number of aggravating

daily hassles or situations regarded as stressful over a long time period may have detrimental health effects. In contrast, there is no doubt about the personal significance of major life events and their potential impact on health. Extreme stressors can create both acute and prolonged psychological distress and bodily ailments.

Research is inconsistent when it comes to answering the question of whether the characteristics of the event itself (e.g., injury, threat, near-death experience) or the changes that occur in its aftermath (e.g., relocation, job loss) are responsible for adjustment difficulties. How does stress cause illness? It is a general assumption that stress leads to poor health in a number of different ways. According to Selye (1956), stress operates in three phases: alarm, resistance, and exhaustion. When the organism's resistance breaks down, an ensuing long period of exhaustion can manifest itself in illness. In the 1950s, Selye did not have much evidence for his claim, but today there is a great deal of substantiation. However, a strong linear relationship cannot be expected since illness is obviously caused by many factors, and stress is only one of them, contributing to pathogenesis in one way or another. Generally, correlation coefficients from .20 to .30 are found. Cohen, Kamarck, and Mermelstein (1983), for example, reported an association of only .14 between stress scores and physiological ailments in college students.

Most individuals who experience stress do not develop illness. Stressful life changes are usually temporary, whereas other risk factors for disease can be longer-lasting, for example smoking, alcohol consumption, a high-fat, low-fiber diet, and risky lifestyle in general. When comparing a single life event with those long-term behaviors, the latter seem to be more influential in developing illness. Moreover, the experience of a critical life event is related to coping and social support, whereby these two factors may moderate the stress-illness connection. How can we understand the mechanisms of the stress-illness association? There are three major pathways that link stressful life events to ill health (Figure 2).

Figure 2. Mediators between stressful life events and ill health (excluding other major mediators such as personality, appraisals, coping, and social support).



The main pathway places *physiological changes* as a mediator between origin and outcome, in particular changes of immune parameters, and endocrine and cardiovascular reactivity. Recent research, for example in the field of psychoneuroimmunology, has documented progress in identifying bodily responses to stress that constitute precursors of disease (see Ader, in press; Herbert & Cohen, 1993a, 1993b). Endocrine and cardiovascular reactivity, as expressed in blood pressure, heart rate, or catecholamine excretion, is considered a stress-based codeterminant of cardiovascular disease, including myocardial infarcts. The amount of reactivity is, however, not exclusively governed by the stress experience. Rather, it is moderated by genes, personality, age, and gender, among others (Weidner, 2001).

The other major pathway is represented by *health-compromising behaviors*. People under stress might want to relieve their tension by consuming more tobacco, illicit drugs, alcohol, etc. They feel too absorbed by their stress to monitor their diets and to maintain other preventive behaviors. Adherence to routine self-care might suffer during a stress episode. Among smokers, stress may increase the number of cigarettes consumed as well as the intensity of smoking by deep inhaling. When under stress, women seem to be more likely to engage in unhealthy eating behaviors, whereas men tend to turn to drinking and illicit drug use (Brannon & Feist, 1997).

A third pathway pertains to all kinds of *negative affect* often associated with experiencing stress. Constant rumination, worrying, anxiety, pessimism, depression, and anger are health compromising in the long run. Studies have shown that optimism is related to good health, whereas depression can be a precursor of sickness (Carver, in press). The mechanism of pathogenesis operates through physiological changes, including immune suppression and blood pressure elevations. A review about depression and health outcomes was presented by Scheier and Bridges (1995). Depression maybe a general risk factor for premature death. The evidence for mortality effects is most compelling for cardiac disease. Studies indicate that cardiac patients who were depressed while in the hospital were more likely to die of cardiac causes than those who were not depressed. However, most research in

this area fails to include control variables, such as physical illness at baseline, smoking, or alcohol abuse.

Figure 2 gives a simplified view of mediating effects. In addition, moderator effects can emerge, for example a synergistic relationship between stress, risk behaviors, and ill health. Personality, appraisals, coping, and social support were also not considered in the figure, in order to reduce its complexity.

Efforts in contemporary life event research aim at a better understanding of the linkage between stress and the manifestation of illness. Research striving to identify single events as the cause of illness often fail. Ideally, finding a truly causal relationship between a specific stressor (e.g., loss of a loved person) and a specific disease (e.g., breast cancer) would be a breakthrough in this field. The onset of specific diseases has been related frequently to prior stress experience. Tension *headache*, for example, seems to be closely connected to daily hassles, whereas a link to major life events has not been found. *Infectious diseases* such as the common cold can be triggered by stress. Prospective studies have shown that people develop a cold several days after the onset of negative life events. Experimental studies with the intentional administration of cold viruses have found that persons under stress are more likely to develop a cold than if they are relaxed. In a British common cold unit, Cohen, Tyrrell, and Smith (1991) administered different stress measures, including a stressful life event index based on the past year, to about 400 healthy participants. Then they exposed them to respiratory viruses to see whether they would come down with a cold. Within the experimental group, the number of respiratory infections and clinical colds was related to stress in a dose-response way: the more stressful life events experienced, the higher the likelihood of a cold.

Only a small number of studies focus explicitly on selected stressors in relation to a specific disease (e.g., Jacobs & Bovasso, 2000, on early loss and *breast cancer*; Matsunaga et al., 1999, on sexual abuse and *bulimia nervosa*). In most studies, either stress (often measured by a life event checklist) or health outcomes (assessed by symptom checklists) are unspecific. Moreover, methodological inequalities make it difficult to compare research findings directly. Therefore, it is not surprising that research has produced conflicting results. The following example on *ulcers* illustrates one of the problems, namely the differences in the time span between stress occurrence and health impairment.

In a study by Köhler, Kuhnt, and Richter (1998), participants were asked to indicate events experienced within six months prior to gastroscopy, a screening for duodenal ulcer. Contrary to the widely assumed idea that stress triggers ulcer onset, Köhler and colleagues did not find any relationship between perceived stress or life change scores and duodenal ulcer. Their findings were corroborated in a study by Gilligan, Fung, Piper, and Tennant (1987), who conclude that acute life events do not play a role in duodenal ulcer onset or relapse. They suggest that the reason could be the transient nature of the emotional as well as humoral changes caused by the event.

Kumar, Rastogi, and Nigam (1996) came to a different conclusion by analyzing the number and severity of life events in a sample of *peptic ulcer* patients. Compared to matched controls, ulcer patients reported a significantly higher number of events and greater severity. It is important to note that the time span in this study was longer than in the former study. Here, the occurrence of the events reported was mostly four years prior to the onset of illness.

Studies that focus exclusively on physical health outcomes following an event are relatively scarce. This is due partly to methodological limitations of life event research. The repeated demand for prospective rather than retrospective studies can hardly be met. However, in some cases, settings allow for prospective designs. For example in a study on the effects of job loss, researchers found an increase of *rheumatoid arthritis* during the time of unemployment (Cobb, 1976). There is some empirical evidence on the connection between stress and arthritis, but this is purely correlational. The problem here is that the main cause of

rheumatoid arthritis remains unknown. For diseases whose origin has not been fully discovered, it is difficult to establish a causal role of stress in the pathogenesis.

It is commonly assumed that stress is detrimental to health, and different mechanisms of pathogenesis have been described above. But not everyone develops health problems in the face of severe stress. Other factors operate at the same time. A large body of literature is dedicated to interpersonal differences in dealing with aversive situations. In fact, it is almost impossible to examine the effects of stressful life events without considering the various ways of coping with them. As events differ in their nature and impact, so do people differ in their immediate responses to an event. Since the latter belongs to the realm of coping research and will be addressed elsewhere in this book, we will focus only on some characteristics and health effects of stressful events and the challenges they pose. In the following paragraphs, several stressful life events and their health implications will be discussed.

Research Examples of Stressful Life Events

The following examples stem from a large body of research on a variety of stressful negative life events. Starting with disasters, we will briefly characterize the impact of *natural and man-made disasters* on individuals and communities and will present some findings regarding their health-hazard potential. Further, we will move on to more individual events that are characterized by personal harm and loss, such as *conjugal bereavement* and *criminal victimization*. Finally, we will shed light on studies regarding the health of immigrants and refugees in Western countries. In recent years, with a continuously growing number of world-wide refugees, sojourners, and immigrants, there are increased efforts to investigate the impact of *migration* and *acculturation* on health.

The relationship between stressful life events and the individual's response is indirect in that it is mediated by the perception and evaluation of the disaster impact on the individual as well as the community level. As shown in the empirical data, attempts to examine psychological and physiological correlates of disastrous traumatic events need to allow for short-term as well as long-term analyses of the effects in order to cover full symptomatology.

Natural Disasters

Intense, uncontrollable, and powerful natural forces can dramatically change the lives of thousands of people in a blink of an eye. The devastating effects of sudden natural disasters such as earthquakes, hurricanes, tornadoes, tsunamis, volcano eruptions, floods, and landslides, have been witnessed many times in recent history. One example is an earthquake in the Los Angeles area in 1994 which resulted in 72 fatalities and caused 12.5 billion US$ property damage (McMillen, North, & Smith, 2000; Reich, 1995).

The predictability and impact of natural disasters vary greatly. Every year, the Southeastern states of the United States and neighboring countries experience hurricane season. People living in such areas are able to take precautions before a hurricane hits. Although such an event is predictable, neither the course of the hurricane nor its devastating effects can be influenced. In contrast, earthquakes are virtually unpredictable and take people by surprise. Often lasting only a few seconds or minutes, the destruction of property and the disruption of lives can take months or even years to restore, if at all.

Both short- and long-term psychological and physiological effects of disasters have been widely studied. Large-scale disasters leave behind at least three groups of victims: (a) individuals who have witnessed the event, (b) individuals who were absent then, but are effected by the devastation, (c) and rescue personnel confronted with the devastation. Such extreme experiences have often been studied in trauma research. Individuals who were

exposed to extreme stressors are prone to develop PTSD. Very often, the onset of the disorder is delayed for years (see also Kimerling, Clum, & Wolfe, 2000).

Surprisingly, according to McMillen et al. (2000), victims of natural disasters report the lowest rates of PTSD. On the contrary, Madakasira and O'Brien (1987) found a high incidence of acute PTSD in victims of a tornado five months postdisaster. Again, methodological differences make it difficult to compare various studies, especially when short-term and long-term effects are mingled together. Green (1995) found that especially one year or more after the disaster, diagnosable pathology is the exception rather than the rule. Moreover, only a systematic and detailed analysis of the individual experience (e.g., loss of family members and/or property) would help to determine under which conditions PTSD and other psychiatric symptoms are likely to occur. Nevertheless, individuals involved in other traumatic events, such as combat, criminal victimization or technological disasters, are far more likely to witness grotesque and violent scenes, which in turn may lead to higher incidence rates of PTSD.

Low incidence rates of PTSD should not lead to the conclusion that posttraumatic stress does not exist among the survivors of natural disasters. Survivors may experience a number of PTSD-related symptoms (e.g., unwanted memories, nightmares, event amnesia, sleeping problems), but do not meet all criteria for a psychiatric diagnosis (McMillen et al., 2000). In a study by Sharan, Chauhardy, Kavethekar, and Saxena (1996), 59% of earthquake survivors in rural India received a psychiatric diagnosis that was either PTSD or depression. Here, psychiatric morbidity was associated with gender (women) and destruction of property.

Briere and Elliot (2000) give an impressive overview of a number of studies dealing with the potential effects of exposure to natural disasters (e.g., bushfires; cf. McFarlane, Clayer, & Bookless, 1997). Among the various symptoms that are likely to occur in the aftermath of a natural disaster are anxiety, PTSD, somatic complaints, and substance abuse (Adams & Adams, 1984; McFarlane, Atchison, Rafalowicz, & Papay, 1994). Escobar, Canino, Rubio-Stipec, and Bravo (1992) examined the prevalence of somatization symptoms after a natural disaster in Puerto Rico. They found higher prevalence of medically unexplained physical (e.g., gastrointestinal) and pseudoneurological symptoms (e.g., amnesia, fainting) related to disaster exposure.

In a study on the long-term sequelae of natural disasters in the general population of the United States, Briere and Elliot (2000) found that 22% of the participants had been exposed to a natural disaster (earthquake, hurricane, tornado, flood, or fire). Though the mean period from the last disaster exposure until the study took place was 13 years, researchers found current elevations on six of ten scores in the Traumatic Symptom Inventory (Briere, 1995). Type of disaster did not determine the symptomatology, but the disaster characteristics, such as physical injury, fear of death, and property loss did. Apparently, the number of characteristics people were exposed to played a role for the extent to which symptoms were experienced. Individuals who had suffered all (injury, fear of death, and property loss) scored at clinical levels (see also Rotton, Dubitsky, Milov, White, & Clark, 1997). As the authors conclude from their data, more research efforts should aim at the long-term effects rather than the immediate sequelae of disaster experience.

Finally, a number of studies have looked at the physiological changes that occurred in survivors of natural disaster. For example, in a longitudinal study by Trevisan et al. (1997), factory workers' uric acid levels were measured at three occasions within 12 years. In between, a major earthquake interrupted the study, so that some of the participants were measured before, others after the quake. Those workers measured after the quake had significantly lower levels of serum uric acid than those examined before. Seven years later, workers who reported suffering from the aftermath of the quake had elevated levels of uric acid compared to unaffected individuals.

Technological Disasters

Unlike natural disasters, technological disasters are caused by people. Nevertheless, their occurrence is as difficult to predict as natural forces. In modern civilization, we are surrounded by numerous potentially health-threatening technical devices. Although a large number of specific precaution measures are employed, power plants, giant dams, atomic submarines, or contemporary air traffic harbor a risk of failure with potentially disastrous effects.

Among others, the list of technological hazards includes the release of radiation (e.g., Three Mile Island, Chernobyl), leaking toxic waste dumps (e.g., Love Canal), and aviation and maritime accidents, such as the Exxon Valdez oil spill in 1989, that led to an environmental disaster. Despite similarities between natural and technological disasters as to their unpredictability, uncontrollability, devastation, and impact for the individual and the community, considerable differences may contribute to various mental as well as physical health outcomes.

By definition, technological disasters could have been prevented. Thus, someone can be blamed for the harm and damage, and anger and frustration can be addressed to authorities or single persons. As Green (1995) argues, because of these characteristics, such events might be more difficult to process than natural disasters, which can be seen as inevitable or fate. Effects of technological catastrophes appear to be longer lasting. Support for this assumption comes from a study by Baum, Flemming, Israel, and O'Keefe (1992), who compared 23 flood victims with 27 people living near a leaking hazardous toxic waste dump and 27 control persons. Although only nine months postevent, those persons exposed to the hazardous material were more depressed, anxious, alienated, and aroused than those in the other two groups. Such effects have been found for technological failures as well (e.g., Bromet, Parkinson, & Dunn, 1990; L. Davidson, Fleming, & Baum, 1986).

Green (1995) studied the effects of the Buffalo Creek Disaster. In Winter 1972, a dam constructed from coal mining waste collapsed, releasing millions of gallons of black water and sludge. In the community below the dam, 125 people were killed and thousands were left homeless. Typical for small communities where people know each other well, many residents lost close friends or family members. Looking at the long-term effects on adults, the results indicate a decrease in the psychopathology over one to three years. However, even 14 years later, a subset of survivors still showed continuing effects of the traumatic experience.

In this vein, Arata, Picou, Johnson, and McNally (2000) examined the effects of the Exxon Valdez oil spill on commercial fishers six years after the incident. According to their hypotheses, the fishermen had higher levels of depression, anxiety, and PTSD symptoms compared to a normative sample. One fifth of the fishers showed clinically significant symptoms of anxiety, and more than one third suffered from depression and/or PTSD. Despite methodological limitations, findings are consistent with other research, suggesting chronic impairment as a result from technological disasters (Freudenburg & Jones, 1991; Green, 1995). Posttraumatic stress disorders as a consequence of toxic spills were found in several studies (e.g., Freed, Bowler, & Fleming, 1998).

War and Genocide

A section about disasters caused by humans cannot be concluded without mentioning the most terrible disasters that continue to happen daily at some place in the world, namely war and genocide. Research on the health effects of stressful life events started with recording reactions to war experience. During the two World Wars, psychiatrists examined shell shock and battle fatigue among soldiers. Afterwards, long-term effects of the Holocaust and the wars in Vietnam and Korea were studied as well. Posttraumatic stress disorder (PTSD) is one of the most frequently addressed phenomena in this line of research. Studies focus mainly on specific aspects of the war experience rather than the event as a whole. For example, there is a

large body of research literature on torture victims (Neria, Solomon, & Dekel, 2000), Holocaust survivors (e.g., Lomranz, 1995), and combat stress (e.g., Z. Solomon, 1995). There is overlap with studies on migration effects, since ethnic conflicts, combat, and political persecution are among the most common reasons for people to emigrate.

Psychological and physical impairment can transpire even decades after the traumatic experience. Landau and Litwin (2000) compared a community-based sample of Holocaust survivors at the age of 75 and older with control persons of a similar age and sociocultural background. The assessment of vulnerability included physical as well as mental health and PTSD. The findings suggest that extremely traumatic events have long-lasting effects on the victims. Men who survived demonstrated a higher prevalence of PTSD, whereas women reported greater health-related difficulties and poorer health (Wagner, Wolfe, Rotnitsky, Proctor, & Ericson, 2000).

In line with the former findings, Falger et al. (1992) found among 147 Dutch World War II resistance veterans the highest scores on cardiovascular disease (i.e., angina pectoris, Type A behavior, life stressors, and vital exhaustion) compared to age-matched patients with myocardial infarction and patients who underwent surgery. Moreover, veterans diagnosed with PTSD reported more risk factors.

Eberly and Engdahl (1991) analyzed medical and psychiatric data for US-American former prisoners of war (WW II and Korean War). In comparison with the general population, PTSD prevalence rates were greatly elevated, whereas life-time prevalence rates of depressive disorders were only moderately increased. However, the authors did not find evidence for generally higher rates of hypertension, diabetes, myocardial infarction, alcoholism, and other psychiatric disorders. Within the study group, those former prisoners who had suffered massive weight loss demonstrated a greater number of psychiatric disorders than their comrades.

More evidence for the long-term effects of trauma comes from a study by Desivilya, Gal, and Ayalon (1996), who investigated the effects of early trauma in adolescence for victims' mental health and adaptation in later life. The critical incident took place in 1974 in a small town close to the border of Israel and Lebanon, when hundreds of hostages were taken during a terrorist attack, most of them adolescents. Participants in the study displayed significantly more health problems 17 years later than the nontraumatized individuals in the control group. Also, survivors of the early traumatic event later showed greater vulnerability to psychological difficulties when Israel was attacked by Iraqi Scud-missiles in 1991 (see also Ben-Zur & Zeidner, 1991; Zeidner & Hammer, 1992). As the authors conclude, the scars of the event remained for a lifetime.

These studies, together with other empirical evidence on the effects of traumatic events, underline the importance of long-term observation of health outcomes in traumatized individuals in order to facilitate appropriate intervention and rehabilitation programs beyond acute needs for help.

Conjugal Loss and Bereavement

Experiencing loss is one of the major factors in the explanation of stress reactions. According to Hobfoll's (1989, 1998) conservation of resources (COR) theory, the threat or the actual loss of resources are considered to be powerful predictors of psychological stress. These can occur in many ways: loss of health, job, property, and loved ones. For most stressful life events, loss is an inherent characteristic. This section will focus on conjugal loss and the health effects resulting from bereavement.

Loss of a spouse is regarded as the most stressful experience on the Social Readjustment Rating Scale (SRRS) of Holmes and Rahe (1967). Considering the frequency and likelihood of such an event among those who have close long-term relationships, the

relevance of research in this field becomes evident. In fact, the only way to protect oneself from that experience is to die either before or at the same time as the partner.

The effects of bereavement on morbidity and mortality have been widely studied (for an overview, cf. M. Stroebe, Stroebe, & Hansson, 2000; W. Stroebe & Stroebe, 1992). In particular, gender and age differences in responding to the death of a spouse have received most attention.

A quarter of a century ago, Bartrop, Luckhurst, Lazarus, Kiloh, and Penny (1977) described immunological changes associated with conjugal loss. The death of a spouse is suspected to lead to increased mortality in response to diseases that are presumed to depress the immune function (reduced lymphoproliferative responses, impaired NK cell activity). It has not been demonstrated, however, that morbidity and mortality following conjugal loss are the direct results of stressor-induced changes in immune function (Ader, in press).

Considerable differences between widowers and widows regarding the physical and psychological reactions to an event as well as the coping strategies have been found. One set of studies suggest that men suffer more after losing their partner than women, whereas others report more health complaints of bereaved women.

Miller and Wortman (in press) suggest to examine the impact of loss for the one who is left behind. One might conclude that women should be at more of a disadvantage. Is there any evidence for such an assumption? Traditionally, women depend economically on their husbands. Although norms and values regarding self-determination and economic independence of women have greatly changed over the past decades, especially elderly couples are more bound to traditional roles. Therefore, in addition to the loss of the intimate partner, women also face the loss of income and financial security, which in turn could enhance the vulnerability for illness and the frequency of ailments. With increasing age, conjugal loss becomes a normative life event more often for widows, who outlive their husbands. In turn, widowers have a greater chance to engage in a new romantic relationship simply because there are more potential partners available. These objective disadvantages for widows obviously do not translate into greater health impairment. In contrast, bereaved men are those who are at higher risk for mental health problems, morbidity, and mortality.

Can the life event of losing a spouse be so detrimental that it results in the premature death of the survivor? For decades, studies that have addressed this question have found, on average, that the mortality risk for widows/widowers is increased, compared to those who do not experience this loss (see M. Stroebe et al., 2000). The risk seems to be greatest for men during the first six months of bereavement. There may be several reasons for this gender difference: Men typically have a smaller social network than women, so their loss cuts more deeply into their network (Weidner, in press). Also, bereavement occurs at an older age for men than for women because men, on average, die earlier than their spouses, due to age differences in couples and biological gender differences in longevity. As a result, the death of a wife leaves a man who is older and more in need for support. Moreover, men usually confide in their spouse as their only intimate partner, whereas women cultivate a larger network of family members and friends, to whom they find it easier to turn in times of need. This higher social integration and support may buffer the stressful experience of losing their husbands.

Traumatic grief has been shown to be a risk factor for mental and physical morbidity (Miller & Wortman, in press). When widowers feel socially isolated during the grieving process, they may develop depression and loneliness, which in turn may lead to more severe consequences. For example, in some cases men commit suicide. This is thought to happen five times more often to widowers than to widows. In other cases, their immune system or cardiovascular reactivity may be affected in the long run, resulting in illness and eventually in death. The mechanism of pathogenesis needs to be further explored. Not only death from all causes is higher among widowers, but also specific causes of death, such as suicide. Widowed

individuals show impaired psychological and social functioning, including depression, and some studies report a significant decline in physical health, mainly for men. Frequency of sick days, use of ambulant physician services, and onset of illness according to medical diagnosis seem to be about the same for widowed persons and for controls. Schwarzer and Rieckmann (in press), examining the effects of social support on cardiovascular disease and mortality, found that cardiac events are more frequent among isolated and unsupported widowers. However, there is not much evidence that the onset of specific diseases, such as cancer or coronary heart disease, is actually caused or triggered by conjugal loss or a different kind of bereavement. This may be explained by the long time span of pathogenesis. For example, it takes many years to develop chronic degenerative diseases, and other factors that contribute synergistically to illness may emerge during this time.

Miller and Wortman (in press) analyzed data from 13 studies in terms of gender differences in mortality and morbidity following conjugal bereavement. They provide evidence that widowers are more likely to become depressed, to become susceptible for various diseases, and to experience greater mortality than widows. These effects are more pronounced among younger men.

Some of the causes of death among widowers are alcohol-related diseases, accidents, suicide, and chronic ischemic heart disease. The authors discuss various possible explanations for their findings. The first reason for experiencing widowhood differently may be the different marital roles. Men tend to rely solely on their spouses in many ways. Wives are often the main confidant for their husbands, but they also tend to have larger and tighter social networks that they can mobilize and rely on in taxing situations. Second, in many studies women are found to recognize themselves as support providers rather than as receiver. Until recently, women naturally bear the main responsibility for household and childcare. If such a strong anchor is lost, bereaved men's stress is doubled, not only by taking on new roles in the family, but also by lacking adequate support. Third, for men, widowerhood takes away a powerful agent for social control. Lack of control can translate into a higher risk for men to engage in health-compromising behavior, for example heavy drinking or risky driving. In many marriages, women are responsible for the family's psychological and physical well-being. Wives provide care during illness, are likely to be attentive to necessary changes in health behavior (e.g., dieting), and remind their husbands of regular health check-ups or prevent them from engaging in behaviors that are hazardous to their health.

Criminal Victimization

Whenever a person becomes the victim of an intentional negative act, we speak of criminal victimization . There is an ever-growing public interest in reports on criminal offences. So-called "reality TV" provides life coverage from crime scenes, and daily news broadcasts give an update of the latest developments and the condition of the victims. But many crimes remain undetected. Domestic violence is one of the most common crimes and is committed in silence and privacy. The number of cases reported is far lower than the actual prevalence rate. In most cases, it is women who report physical abuse by their partners. But many battered women do not dare to seek professional help. Instead, they blame themselves for provoking the incident, or they are ashamed or threatened by their abusive partners. Physical nonsexual abuse in this context could be defined as behavior, such as hitting, biting, hitting with an object, punching, kicking, or choking.

Clements and Sawhney (2000) investigated coping of women exposed to domestic violence. Almost half of the battered women reported dysphoria consistent with a clinical syndrome of depression. Abusive severity seemingly did not play a role. Feeny, Zoellner, and Foa (2000) report that 33% of the women living in the United States will experience a sexual or nonsexual assault at least once in their lifetime. Although victims of domestic violence,

rape, burglary, robbery, and other severe traumatic events, such as accidents, show surprising commonality in their emotional reactions to the event (Hanson Frieze & Bookwala, 1996), the physical effects of each of the events listed can differ greatly. The immediate response after confronting extreme stressors may be denial, disbelief, self-blame, numbness, and disorientation. Another common outcome of exposure to unusually stressful situations is PTSD. Symptoms include, for example, re-experiencing the event, avoiding reminders, trouble with sleeping, nightmares, and chronic hyperarousal.

Traumatic events not only contribute to mental health problems, they also lead to an increase of physical health complaints. According to Zoellner, Goodwin, and Foa (2000), unspecific complaints, such as headaches, stomachaches, back pain, cardiac arrhythmia, and menstrual symptoms, are among the most common problems.

The question arises whether the event itself or its psychological correlates can be held responsible for somatic complaints. As has been shown in the section on combat veterans, PTSD was associated with an increased risk for cardiovascular disease. To date, research on the relationship between a stressful event and physical health with PTSD as the moderating variable have remained relatively scarce.

Zoellner et al. (2000) conducted a study with 76 women who were victims of sexual assault suffering from chronic PTSD and who were seeking treatment. The results show negative life events, anger, depression, and PTSD severity related to self-reported physical symptoms. Moreover, PTSD severity predicted self-reported physical symptoms above and beyond these factors.

A number of studies have explored the relationship between sexual abuse and the onset of eating disorders in later life. The contexts of these studies vary (e.g., sexual abuse as part of a torture experience versus domestic sexual abuse during childhood). For example, Matsunaga et al. (1999) explored the psychopathological characteristics of women who had recovered from bulimia and who had a history of sexual abuse. Abused persons revealed a trend toward lifetime diagnosis of PTSD and substance dependence. Judging from these findings, authors suggest a possible association between abusive experiences and psychopathogenesis of bulimia nervosa. Moret (1999) did not find differences in eating behavior and body image concerns between women with and without sexual abuse in their past. Nevertheless, sexually abused women might be prone to develop an eating disorder because they show more psychological traits commonly associated with these disorders, such as perfectionism, maturity fear, or interpersonal distrust. Teegen and Cerney-Seeler (1998) found a correlation between the severity of traumatization in victims of child sexual abuse and the frequency of eating disorder development.

Migration

Migration is increasingly becoming a typical facet of modern society. The globalization and internationalization of industries contribute to a constant flow of people from one country to another. The reasons why people migrate range from economic difficulties, civil wars, ecological disasters (e.g., repeated drought or flood), and political persecution affecting their work and study. Forceful displacement, uprooting from the homeland, and resettlement in a new environment cause physical as well as psychological scars. Extreme stress can occur at any point of the migration process—prior to, during and after. Thus, exposure to a number of stressors may cumulate and can be responsible for health problems long after migration. Many individuals who have escaped war, ethnic cleansing, political persecution or famine carry into their new countries the burden of these stressful experiences.

After the Islamic revolution in Iran in 1979, for example, many political opponents of the new regime were forced to live in the underground with the constant threat of discovery, imprisonment, and torture. Many of those in prison had suffered extreme torture, witnessed

the killing of other prisoners, and lived in constant fear for their families and friends. Moreover, escaping from the country is often not only a dangerous, but also a costly endeavor, sometimes exhausting the financial resources of entire families. Migrants who cannot leave their homeland legally often have to pay large sums of money to traffickers who promise to take them to the desired country. Also, the very process of migration itself can be a source of extreme stress. Thousands of illegal migrants are forced to hide, sometimes without food or water for many days, in cars or ships, or even outdoors without shelter. Finally, arriving at the destination, migrants often face new legal and personal problems. Migrants who are weakened physically and psychologically by traumatic experiences, coupled with continuous stress regarding adaptation, acculturation, and integration into the new society, are especially vulnerable to physical and mental illness.

Following Hobfoll's (1998) COR theory, migration stress can be explained by the threat of loss and actual loss of resources of any kind. The chances to compensate these losses and to restore one's resources are very limited, at least at the beginning of the adaptation process in a new country.

Living in a foreign country is inevitably associated with social and material losses as well as new challenges, regardless of the duration or purpose of the stay. To some extent, all newly arrived travelers, sojourners, immigrants, and refugees face similar challenges: different climate, new language, and unfamiliar customs, cultural norms, and values. In cases of involuntary relocation, uncertainty about the duration of the stay can contribute to elevated levels of stress. Also, the greater the cultural differences between the indigenous and host cultures, the more stress is likely to be expected.

Acculturation stress (Berry & Kim, 1988; Schwarzer, Hahn, & Schröder, 1994).) often emerges in conflicting situations with members of the own ethnic or cultural group and the dominant group of that society. Potential stressors range from everyday life with the family or at the workplace to direct effects that are often associated with migration, such as status loss, discrimination, and prejudice. Acculturative stress and the behavior that results from coping with it are very likely responsible for mental health problems and somatic complaints.

Another common source of continuing stress are bad news from the home country, survivor guilt related to leaving family and friends behind, and thoughts about the duty to care for them (Graham & Khosravi, 1997; Lipson, 1993). Studies by Yee (1995) on Southeast Asians in the USA as well as Tran (1993) on Vietnamese confirmed the hypothesis that acculturation stress coupled with stressful experiences lead to poorer health. Along this line, Cheung and Spears (1995) assume a strong association between negative life events and depression among Cambodian immigrants in New Zealand. Moreover, they identified lack of acculturation, feelings of discrimination, and poor language skills as risk factors for mental disorders.

Chung and Kagawa-Singer (1993) examined predictors of psychological distress among Southeast Asian refugees. Even five years after arrival in the USA, premigration stressors, such as number of years in the refugee camp, number of traumatic events, and loss of family members, significantly predicted depression. Apart from cultural changes, living conditions for immigrants are often below average, especially for refugees from Third World countries. Here, postmigration factors (e.g., income, work situation, language skills) also played a role in the development of mental health problems (e.g., Hyman, Vu, & Beiser, 2000). Lipson (1993) reviewed studies on Afghan refugees' mental health. Afghan refugees residing in California displayed high levels of depression and psychosomatic symptoms of stress. This is assumed to be due to family role changes and the resulting conflict in the American society. Furthermore, loneliness as well as isolation among the elderly have been linked to psychiatric morbidity.

One of the rare studies on the physical health of refugees comes from Hondious, van Willigen, Kleijn, and van der Ploeg (2000), who investigated health problems of Latin

American and Middle Eastern refugees in the Netherlands, with special focus on traumatic experience and ongoing stress. Study participants, who had experienced torture, reported medical complaints. Surprisingly, PTSD was identified only among few of the respondents. However, not only traumatic experience prior to migration, but also worries about current legal status, duration of stay, and family problems contributed to ill health.

These studies underline the common assumption that acute as well as chronic stressors in the larger context of migration contribute to poorer physical as well as mental health. Various factors, such as acculturation styles, education, income, or social networks moderate the relationship between migration and health. Future research should support programs tailored culturally and individually that help immigrants to recover from their traumatic experiences, restore a normal life, and find their place in the new society.

Stressful life events in the light of individual differences: Gender, culture, ethnicity, and age

Health reactions in the aftermath of a disaster are largely determined by the impact of an event, e.g., number of casualties or material damage. As a consequence, if those goods (*resources*) we value are threatened or lost, stress occurs (Hobfoll, 1989, in press). However, societal structures as well as cultural norms and values largely determine the way individuals respond to the incident. Although it is often believed that such valuable goods or resources are the same across cultures, we can assume that the weight given to each resource varies (Hobfoll, in press).

On the other hand, certain resources and their impact are almost universal. For instance, in all societies, the loss of a loved one is regarded as extremely stressful for the individual. Nevertheless, reactions to the loss of a family member may be multifaceted due to different cultural traditions, religious beliefs, and attitudes toward family. For example, one might assume that in large multigenerational families with close ties between individuals, family members are better able to support each other in the grief process, compared to small families where the deceased may have been the only confidant for those who are left behind.

Another example of cultural differences in response to stressful events is the diversity of attitudes toward loss and grief. Often, those attitudes are closely related to religious beliefs within each culture. Gillard and Paton (1999) examined the role of religious differences for distress following a hurricane in the Fiji Islands. They compared the impact of hurricane Nigel in 1997 on Christian Fijians, Indians following Islam, and Indians practicing Hinduism. Results indicated that religious denomination had a differential impact on vulnerability. Gillard and Paton show that one major difference between all three groups lies in the amount of assistance that was provided for the victims of the disaster. Moreover, the unfulfilled expectations of Muslims and Hindus as to support provision constitute a stressor that may increase their vulnerability.

As often, most widely used psychological principles and theories are derived from research that is anchored in Western scientific practices. Yet, there is an overall agreement that, for example, women and men differ in their responses to stressful events. In the same vein, socioeconomic factors have been detected as being central to the way individuals cope with adverse situations.

Gender roles and economic equipment vary greatly across nations and cultures. Given the fact that gender, socioeconomic status and culture are often intertwined, methodological problems may be one cause for the relative scarcity of research in this field. However, these differences are rich avenues for study.

Gender

There is ample evidence for gender differences in response to stressful life events. For example, Karanci, Alkan, Balta, Sucuoglu, and Aksit (1999) found greater levels of distress and more negative life-events for women than for men after the 1995 earthquake in Dinal, Turkey. Ben-Zur and Zeidner (1991) found women reporting more anxiety and bodily symptoms than men, as well as higher tension, fear and depression during the Gulf war. Bar-Tal, Lurie, and Glick (1994) came to a similar result when they investigated the effects of stress on men and women Israeli soldiers. Women's situational stress assessment as well as stress experiences were higher than those of the men.

Although women in fact often report more distress and bodily symptoms than men, one should not conclude that women generally lack appropriate coping skills. For example, in response to the death of their spouse, women seem to be better capable than men of overcoming the loss.

Since the vast majority of research relies on self-report scales, we presuppose that women have a greater tendency to admit symptoms such as pain, depression or negative mood. In Western societies, men are commonly expected to be psychologically and physiologically more resilient than women. Admitting pain or depression would be contradictory to the desired male picture.

Keeping that in mind, findings on the causes of death among bereaved men appear in a different light: risk behavior that either includes or leads to an unhealthy diet or lifestyle (e.g., smoking, drinking, fast driving) is again more acceptable for men than for women.

Another factor that has to be taken into account is the social support system. The perception, availability and activation of social support is a major factor in successfully dealing with stress. Women tend to have larger and tighter networks that enable them to seek support from many sources, whereas men often solely rely on their spouses as support provider (Greenglass, 1982; Hobfoll, 1986; Simon, 1995).

Striking evidence for the importance of support as a predictor of negative affect and health complaints after a stressful life event comes from a study on East German migrants (Knoll & Schwarzer, in press). Women who reported the most social support also reported the least health complaints. This effect could not be replicated for the men in the study. Again, this result could partly be due to societal constraints in two ways. First, from a more context-specific perspective, finding work in West Germany was probably more difficult for East German women than for men. The pronounced age effects among women underline this notion. Since older women in the study revealed the highest levels of health complaints and the lowest levels of support, we can assume that environmental (e.g., socioeconomic) factors have contributed to either the perception or even the actual reception of social support.

Second, as Hobfoll (1998) argues, men and women are assumed to have different experience with social support. Whereas men are supposed to be more independent and self-reliant, women are expected to seek and provide support for others. Research on gender differences in dealing with life-threatening diseases has contributed considerably to the discussion. Again, differences between men and women are primarily mediated by the social support they seek and receive.

Gender and Culture

If gender differences in response to stressful events follow from culturally-defined norms, what does the picture look like in societies that foster different views of masculinity and femininity than our Western societies?

From this point of departure, Norris, Perilla, Ibañez, and Murphy (2001) conducted a study to identify the causes for higher rates of PTSD among women compared to men, as

epidemiological research suggests. The authors argue that it is complicated to determine the extent to which sex differences are culturally bound if one does not include distinct societies in the research. Thus, Norris et al. (2001) picked two countries with a distinguished cultural heritage and makeup: Mexico, where traditional gender roles are fostered, and the United States, where the roles of women and men are less rigidly defined. Data were collected six months after Hurricane Paulina hit Mexico and Hurricane Andrew hit the United States.

The findings confirmed the hypothesis that women were more highly distressed by these natural disasters than men. This was especially prominent among Mexican women, who were also most likely to meet the criteria for PTSD. These findings support the hypothesis that traditional cultures amplify gender differences in response to disastrous events.

Nevertheless, other external factors may have been influential. As the authors critically state, Mexico does not have sufficient resources to provide for disaster relief, contrary to their wealthy American neighbor. According to COR Theory, resourcefulness plays the central role in dealing with stress, even long after the actual event. These findings notwithstanding, biological, feminist/psychodynamic and social cognitive perspectives cannot be excluded from the discussion. Conclusive evidence for the explanation of culturally bound gender differences is still missing.

Culture and Ethnicity

Beyond the discussion of gender differences, probably anyone would agree that cultural standards may have the potential to shape the experience of catastrophic events. In addition, cultural norms and values largely determine the needs of disaster-struck individuals. This becomes especially evident when disaster relief and aid measures are planned and administered in a culture different than those of the rescue personnel.

Since most natural disasters occur in underdeveloped countries or regions, this scenario is rather the rule than the exception. Moreover, in pluralistic countries with a multicultural makeup, such as Canada, the United Kingdom or the United States, rescue personnel is challenged to be prepared for culturally-tailored counseling even within their own society. Therefore, culturally sensitive methods and approaches are needed to meet the various needs of different cultural groups (Doherty, 1999).

One convenient way of studying the role of culture, ethnicity, and religion in a stressful situation is by comparing different ethnic immigrant groups regarding either the acculturation process or their responses to catastrophic events within the host country. As to the former, acculturation has been regarded a stressful encounter since newly arrived immigrants face a number of challenges. However, immigrant groups of different nationality are difficult to compare since the numerous factors that determine acculturation (e.g., socioeconomic equipment or migration history) vary greatly across immigrant groups.

The latter approach of studying ethnic differences in response to stressful events was taken by Webster, McDonald, Lewin, and Carr (1995). They conducted a study to scrutinize the effects of natural disasters on immigrants and the host population. In the aftermath of the 1989 Newcastle, Australia, earthquake, the General Health Questionnaire as well as the Impact of Event Scale for event-related psychological morbidity were administered to immigrants with a non-English background as well as to Australian-born controls. Data analyses showed greater psychological distress among the non-English group. Among those, women, older people, and those who had experienced dislocation following the earthquake were especially distressed. Other factors, such as personal history of traumatization and age upon arrival, were also found to contribute to the increased levels of psychological distress.

Age

Unfortunately, only few empirical findings are available about the influence of age in the face of aversive situations. According to theories of successful development, resources available

for coping with stressful situations diminish with age. Since resources are the key to successful coping with life events, elderly people are presumably worse off than younger ones. Is that really the case?

Cwikel and Rozovski (1998) investigated the immigration process of people from the former Soviet Union to Israel. The immigrants came from republics adjacent to the Chernobyl power plant. The authors found that the "late-in-life" immigrants (Torres, 1995), those aged 65 years and older, were disadvantaged in terms of adaptation and integration. Moreover, the recovery process after the event was slower among immigrants 55 years and older compared to the younger group.

In a study on Chernobyl victims, younger adults displayed greater fears of health risks than older individuals (Muthny, Gramus, Dutton, & Stegie, 1987). In the same context, Hüppe and Janke (1994) found women and younger people (18-39 years old) to be more concerned than men and older individuals (40-59 years), respectively. On the contrary, investigations in the aftermath of natural disasters often reveal stronger concerns by elderly victims. In terms of depression, Toukmanian, Jadaa and Lawless (2000) found older (31-55 years old) individuals who were exposed to an earthquake scoring higher on depression scales than younger people (17-30 years). Also, the common gender effect of women being more highly depressed than men could be replicated.

Ben-Zur and Zeidner (1991) investigated psychological distress and health complaints under the threat of missile attacks during the Gulf war. Here, younger adults reported more anxiety, bodily symptoms, anxiety, fear and depression compared to older adults. This finding is consistent with other results, as Milgram (1994) reports in a summary about Gulf-war-related studies. Explanations of these age differences refer to the greater experience that older Israeli citizens have with war-related stressors. Moreover, older individuals' coping efforts have been proven effective in other situations.

The diversity of research findings does not allow for a final conclusion. However, the vast majority of studies have detected resources as the primary determinants of successful coping with an event, which in turn buffers the detrimental effects for the mental and physical health of the victims.

Future Directions

Stressful life events constitute an important research paradigm for health psychology. They are commonly seen as independent variables, called stressors, that lead to a number of predominantly negative outcomes. From a stress theory perspective, however, this bivariate relationship is too simplistic. Stress is a process that takes place in context, and the amount of stress actually perceived is different from the objective magnitude of a stressor. Characteristics of the taxing event, such as intensity, duration, predictability, and controllability, have some bearing on the way this actual event is cognitively appraised by individuals, along with other determinants, such as personality, social networks, and coping resources or vulnerabilities (Aldwin, Sutton, & Lachman, 1996). Research on stressful life events too often adheres to a stimulus-based view of stress, neglecting transactional processes.

This shortcoming is also reflected by the measurement of stress. One common research prototype in health psychology rests mainly on checklists or interview schedules on life events that require the respondents to review all demanding and disastrous situations in the past and to supply subjective ratings of incidence and severity. These ratings of cumulative life stress can lead to an ambiguous sum score that may obscure various exposure conditions and may mask more information than it reveals. Moreover, the rating procedure confounds the current psychological state with an accurate recollection of past events. If the research question deals with mental health effects of prior stress exposure, one can hardly arrive at meaningful conclusions by asking respondents about the severity and impact of their

life events. A different common research prototype lies, for example, in sampling survivors, observers, or rescue workers of a disaster. In this situation, the stressful life event is given by definition. To yield an index of severity, predictibility, controllability, or other characteristics of the event, one can ask independent judges to rate the event along a number of dimensions. This provides useful stimulus information that should be supplemented by data on victims' cognitive appraisals.

Stressful life events can shape individual biographies and affect mental and physical health to a large extent, including premature death as a result of suicide or severe disease. Numerous studies have documented morbidity and mortality data as a result of stress. The relationship between stressful life events and health, however, is complex, and it requires consideration of mediators and moderators. Several pathways portray the causal mechanisms. One path refers to stress-induced physiological changes, such as the wear and tear on blood vessels, immunosuppression, or endocrine and cardiovascular reactivity. This again might not be a direct relationship, but it could be mediated by negative affects that follow stressful life events. Constant rumination, worrying, loneliness, or depression themselves generate physiological changes that produce illness in the long run. A different pathway is represented by stress-induced behaviors that impair health, such as smoking, alcohol consumption, lack of exercise, sleep deprivation, unhealthy eating, etc. Furthermore, someone who is already ill and needy might fail to mobilize social support, seek treatment, adhere to medication, etc., in times of severe stress.

The existence of several causal pathways in the development of poor health is intuitive, but empirical evidence is sparse. One of the reasons for this deficit lies in the difficulty to identify synergistic effects. Moreover, one cannot discover causal links when only cross-sectional data are available. The existing state of research calls for longitudinal and prospective study designs that allow for a more detailed analysis of the stress/health association, including mediators and moderators, such as personality, coping, and social support. Many clinical and community interventions have been initiated, mainly as debriefing and crisis counseling, but they are not well evaluated. Systematic intervention studies allow treatment effects to be examined, for example by testing coping strategies that aim to modify certain stress/health pathways.

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