How the Mind Hurts and Heals the Body

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The author reviews some of the social and behavioral factors acting on the brain that influence health, illness, and death. Supported with data from several areas of research, his proposal for understanding health and illness provides both the concepts and the mechanisms for studying and explaining mind–body relationships. The brain is the body's first line of defense against illness, and the mind is the emergent functioning of the brain. This mind–body approach incorporates ideas, belief systems, and hopes as well as biochemistry, physiology, and anatomy. Changing thoughts imply a changing brain and thus a changing biology and body. Belief systems provide a baseline for the functioning brain upon which other variables act and have their effects.

> The mind is its own place, and in itself
> Can make a Heav'n of Hell, a Hell of Heav'n.
> —John Milton, *Paradise Lost*

In 1948, the World Health Organization defined health as the presence of well-being—physical, mental, and social—not as the absence of disease. The American Psychological Association amended its bylaws in 2001 to recognize "promoting health" as one of its major missions (Thorn & Saab, 2001). In the past, the point of contact between psychology and health has sometimes been couched in economic terms: for instance, as in the title of one article, "The Impact of Psychological Interventions on Medical Cost Offset" (Chiles, Lambert, & Hatch, 1999; see also Cummings, 1999). The dollar savings are impressive—up to 20% in some situations—but the interventions are only rarely used (Sobel, 2000). Another focus has been on the contributions psychology can make to the prevention of substance abuse and other behavioral social issues such as child abuse (Carpenter, 2001; Ray & Ksir, 2004). These are important, logical extensions of mainstream psychology's skills and science and should certainly be encouraged.

Health care is changing, as anyone involved in the treatment of patients well knows (Grol, 2001; Shine, 2002). Newspapers report daily on HMOs, alternative medicine, health care costs, and many other issues. This article goes beyond the traditional psychology–health issues and the transient changes and topics discussed every day and provides evidence for a new perspective for understanding health and disease, life and death.

Robert Ader (as quoted in Cherry, 1980) has alluded to this new perspective on health in the following way: "There's been a huge transformation in the way we view the relationship between our mind and good health, our mind and disease. . . . In many ways, it's nothing short of a revolution" (pp. 94–96).

Table 1 summarizes several components of this transformation in health care and the new perspective. The middle column, labeled *Past*, has also been termed the biomechanical (or biomedical) model. The right-hand column is the way of the future—the underpinnings of health care for the next several decades. It has been called the biopsychosocial model. These concepts are part of this new perspective and are important to consider because "all healers have a set of beliefs to which they refer in their practice" (Prioreschi, 1991, p. 4).

This new approach to health says loudly and clearly that the causes, development, and outcomes of an illness are determined by the interaction of psychological, social, and cultural factors with biochemistry and physiology. Our physiology and biochemistry are not separate and distinct from the rest of our life and our experiences. The mind—a manifest functioning of the brain—and the other body systems interact in ways critical for health, illness, and well-being.

One report commented that " 'patient-centered care' is emerging as a key concept in modern medicine" and mentioned that patients who exerted "more control" and had "more expression of emotion" (Frishman, 1996, p. 1) during their visit to the doctor's office showed improved health and felt better. In other words, an active approach to our health increases our chances of getting better.

Chiong (2001) concluded that "the modes of explanation appropriate to illnesses like infections and poisons may not be applicable to more complex complaints, such as those involving interactions between mind, body and culture. . . . new modes of characterizing medical problems are needed" (p. 90).

A report by Pincus (2000) provides support for the patient-oriented focus of the biopsychosocial model summarized in Table 1, and Chiong's (2001) conclusion provides a possible basis for the recent shift in the health care model away from the historically based biomedical model.

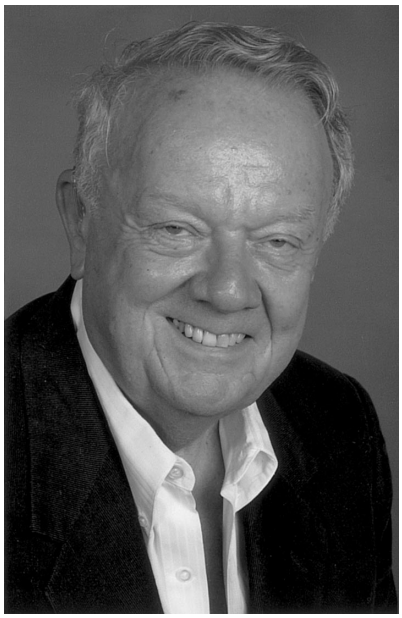
Editor's note. Robert M. Kaplan served as action editor for this article.

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Many thanks to Bruce Overmier for suggesting I write this article and to Floyd Bloom for critiquing an earlier version.

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Vol. 59, No. 1, 29–40 DOI: 10.1037/0003-066X.59.1.29



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Some History

How has health care developed in our civilization? Hippocrates (ca. 460–ca. 377 BCE) said many wise things, but I here mention only one: "It is better to know the patient who has the disease than it is to know the disease which the patient has" (as quoted in Wesley, 2003).

Around 200 CE, Galen said that only about 20% of the patients who came to see him had some physical basis for their symptoms. Maybe patients and symptoms never change. A recent study echoed Galen and summarized its findings from a survey of general medical clinic patients, saying that "only 16% of their complaints were explained by biophysical paradigm of disease" (Merrill, Camacho, Laux, Thornby, & Vallbona, 1991, p. S4).

For the next 1,400 years, body, mind, and soul remained inseparable. In the 17th century, René Descartes proposed a dualistic view of humans that said that the soul (mind) and body were separate entities. This was a great step forward because the Catholic Church accepted his concept as well as its logical conclusion that the human body could be studied without negatively affecting the soul.

Pasteur and the many "microbe hunters" (De Kruif, 1926) who followed him have provided the citizens of the 20th and 21st centuries with some victories over the infectious diseases that have been the scourge of mankind since the beginning of recorded history. As people survived to greater ages and their lifestyles changed, a new set of diseases and illnesses began to appear.

It must be emphasized, however, that not all of the victories over illness and disease were the direct result of biomedical advances (Frenk, 1998). Figure 1 shows clearly that for many of the major infectious diseases, the decline in their incidence began around 1900, well before the occurrence of medical advances targeted at the disease.

Major psychosocial changes also occurred in the United States around 1900, which resulted in "a new outlook on life's possibilities, a new optimism about enlarging the human experience, a hopefulness that the human animal had entered a new stage of evolution. . . . [There was] a pervasive, exhilarating optimism in the land" (Abrams, 1978, pp. 1–2). One medical and social historian emphasized the importance of social and psychological variables in the decline of these diseases before the medical interventions:

> The history of rapid health gains in the United States is not unique; the rate at which death rates have fallen is even more rapid in more recently modernizing countries. The usual explanations for this dramatic improvement—better medical care, nutrition, or clean water—provide only partial answers. More important in explaining the decline in death worldwide is the rise of hope and the decline in despair and hopelessness. (Sagan, 1987, p. 184)

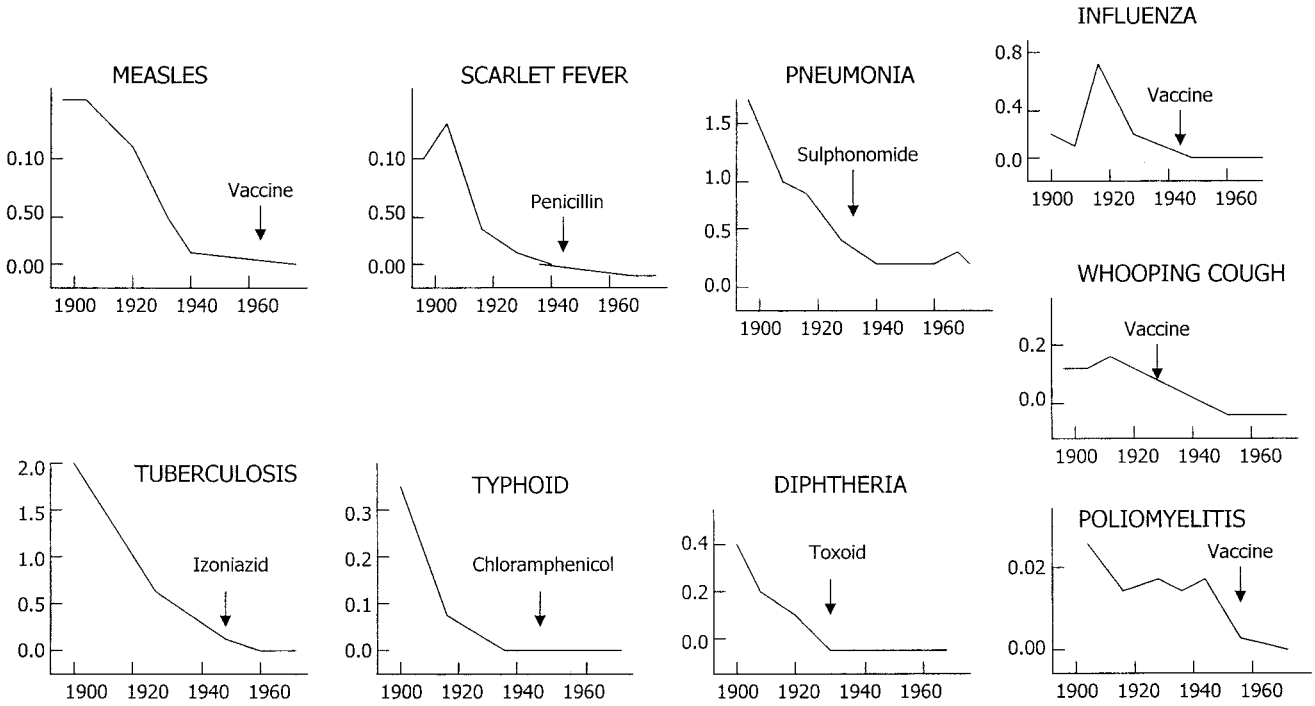
An increase in hope and a decrease in despair and hopelessness—all functions of the mind—may be critically important factors in our improved health and longer life. There are many data to support this. A prospective study of coronary heart disease (CHD) and paper-and-pencil-measured optimism found that "a more optimistic explanatory style, or viewing the glass as half full, lowers the risk of CHD in older men" (Kubzansky, Sparrow, Vokonas, & Kawachi, 2001, pp. 913–914) and discussed other research showing a link "between pessimism, hopelessness, and risk of heart disease" (Kubzansky et al., 2001, p. 910). A 30-year study reported that "a pessimistic explanatory style . . . is significantly associated with mortality" (Maruta, Colligan, Malinchoc, & Offord, 2000, p. 140).

Anthropological evidence suggests that beliefs and expectations contribute to sickness and death but, just as important, that beliefs and expectations also heal (Hahn, 1987). Research is now beginning to specify these nonmedical factors that help people resist illness and live longer.

Table 1
Health Care Models

Components of health care models	Past	Future
Focus	Fighting sickness	Building health
Emphasis	Environmental factors	Behavioral factors
Cause of disease	Pathogen	Host–pathogen interaction
Patient role	Passive recipient of treatment	Active in treatment and health
Belief system of patient	Irrelevant	Critically important
Physician role	Determiner of treatment and healing process	Collaborator in treatment and healing process

Figure 1
The Fall in the Standard Death Rate (per 1,000 Population) for Nine Common Infectious Diseases in Relation to Specific Medical Measures for the United States, 1900–1973



Note. From "Medical Measures and the Decline of Mortality," by J. B. McKinlay and S. M. McKinlay, in *The Sociology of Health and Illness: Critical Perspectives* (p. 25), by P. Conrad & R. Kern (Eds.), 1981, New York: St. Martin's Press. Copyright 1982, by Bedford/St. Martin's. Reprinted with permission of Bedford/St. Martin's.

Psychoneuroimmunology

Before reviewing the research that forms the basis for this article and the rationale for this paradigm of health and illness, we must remember that there are four interacting information-processing systems in humans: the mind (the functioning of the brain), the endocrine system, the nervous system, and the immune system (Maier, Watkins, & Fleshner, 1994). These four systems continually communicate with each other, and the science and paradigm of health incorporating all of these systems have been termed *psychoneuroimmunology*. Several excellent reviews have discussed neuroendocrine–immune system interactions—mechanisms and illness implications (Iransan, Antoni, & Lutgendorf, 1995; Keller, Shiflett, Schleifer, & Bartlett, 1994).

The ideal in this area of research is a study in which (a) predictions are made about the occurrence of stressful situations, (b) immune system functioning is monitored, and (c) health/illness changes are tracked. Such studies are difficult to accomplish well. An excellent study was performed in which 40 first-year medical students were followed for one year, monitoring the effectiveness of their immune systems before and during several exam periods. The prediction was that the medical school exams would be stressful and that this stress would impair the functioning of the immune system. Impairment to the immune system should result in an increase in infectious illnesses. This complex study linked measurable changes in stress associated with concomitant depression in certain aspects of the immune response and increased risk for infectious illness. The number of days of activity restricted due to self-reported acute illness (e.g., upper respiratory tract infections) was associated with examinations and decrements in cellular immunity. In other words, the stress of exams did seem to weaken the students' immune systems and to lead to more infections and illness (Kiecolt-Glaser & Glaser, 1987).

We are beginning to understand how these four systems interact to ensure health, fight disease, and delay death. We are also learning what happens when the systems fail (McEwen, 1999). Fundamental to understanding the biopsychosocial approach is an awareness that three of the systems—nervous, endocrine, immune—have receptors on critical cells that can receive information (via messenger molecules) from each of the other systems (Dantzer, 2001; Raison & Miller, 2001; Trautmann & Vivier, 2001). For my purposes, I consider the fourth system, the mind (psyche), as the functioning of the brain (Andreasen, 1997). Our thoughts, our feelings, our beliefs, and our hopes are nothing more than chemical and electrical activity in the

nerve cells of our brains. It is literally true that as experience changes our brains and thoughts, that is, changes our minds, we are changing our biology.

From the biopsychosocial perspective, the mind is one activity of the brain, and this activity of the brain is the body's first line of defense against illness, against aging, against death, and for health and well-being. The concepts and facts I cover below are not ephemeral but are based in biochemistry, physiology, and neuroanatomy (Azar, 2001).

Several years ago, Norman Cousins used the phrase "belief becomes biology" (Cousins, 1989). That is certainly true. We know that our beliefs influence the biology of our bodies. When an experience is psychological, not physical, it is all in the mind. However, because the mind is a part of the functioning brain, the body responds to the brain regardless of whether the beliefs and ideas are imaginary or based in reality, or whether they are positive or negative. What a person thinks does make a difference—sometimes it is good for him or her, sometimes it is bad.

In 1998, Eric Kandel, a Nobel Laureate in Physiology or Medicine in 2000, provided the general mechanism whereby beliefs do become biology. That is, he explained the process used in the body to convert the electrical activity in the brain, which represents thoughts, into longer lasting changes in the body. He said,

> Insofar as psychotherapy or counseling is effective and produces long-term changes in behavior, it presumably does so through learning, by producing changes in gene expression [i.e., the actions of genes on the body's biochemistry] . . . that alter the anatomical pattern of interconnections between nerve cells of the brain. . . . Stated simply, the regulation of gene expression by social factors makes all bodily functions, including all functions of the brain, susceptible to social influences. (Kandel, 1998, p. 460)

The Determinants of Illness

Many factors interact within an individual to determine the development of an infection. (A phrase such as *proximal cause* may be substituted in place of *pathogen* for those illnesses/diseases where infections may not be involved.) In today's world, where there is much talk about the human genome and the genetic influences on everything from intelligence to schizophrenia, can anyone doubt the contribution of genetic factors in the determination of susceptibility to infection (Koch, 2001; Winkelstein & Childs, 2001)?

In a similar way, personality (Eysenck, 1991; Friedman & Booth-Kewley, 1987), lifestyle (Jacobs, Spilken, & Norman, 1969), and environment (Haggerty, 1980) have varying effects on the development of an infection for different individuals (Kemeny & Laudenslager, 1999). Finally, one cannot have an infection without a pathogen—which may strongly or weakly contribute to the likelihood of an infection developing.

The idea that an individual can be infected but not ill may seem strange to many individuals but is well known to those working in the health professions. Dubos (1955) wrote about the differences between exogenous infections and endogenous infections. Exogenous infections are those in which illness directly results from exposure to a pathogen (e.g., smallpox). Endogenous infections are those where the pathogen is frequently present in and has established equilibrium with the body; illness results when the infection exceeds the ability of the milieu to adapt and maintain equilibrium (e.g., tuberculosis). There are many studies that show a high percentage of individuals infected with a pathogen, with only a small percentage developing symptoms and exhibiting illness behavior (Cohen, Tyrrell, & Smith, 1991; Haggerty, 1980).

Stress/Allostatic Load

Stress, "a rubric consisting of many variables and processes" (Lazarus & Folkman, 1984, p. 12), is a major way of upsetting important health-related homeostatic systems, such as the equilibrium between the body and a pathogen (Bremner, 1999). As our knowledge of these systems and their interactions has increased, new formulations have been developed. McEwen (2002) has introduced two concepts.

> Allostasis is produced by a swift and intricately organized system of communication. It links the brain, which perceives a novel or threatening situation; the endocrine system (chiefly the adrenal glands), which is primarily responsible for mobilizing the rest of the body; and the immune system for internal defense. (McEwen, 2002, p. 6)

He used the term *allostatic load* to describe "the damage that the allostatic response causes when it is functioning improperly" (McEwen, 2002, p. 7).

Whether one prefers the historical term *stress* or the more modern and more specific term *allostatic load*, the question here is, Under what conditions does it develop? There are two components to consider. One introduces the demands of an individual's environment—real or perceived—and these demands may be few or many and simple or complex. The second part of the equation relates to the individual's coping skills (resources), and these can vary from few to many.

Stress/allostatic load is experienced when there is an inadequate match between an individual's coping skills and the environmental demands that the individual believes these skills must confront. It is important to note that it is not the coping skills that individuals have or do not have that are important. What counts are the coping skills that individuals believe they have or do not have. Similarly, except for some obvious physical environmental situations—such as natural disasters—the important determiner of life demands is the perception of the situation. Hans Selye (as quoted in Justice, 1994), the man who made the world pay attention to stress, said, "It's not what happens [to you] that counts; it is how you take it" (p. 258).

The balance between the individual's coping skills and the environmental demands determines psychological equilibrium or disequilibrium. There are many components that constitute coping skills, but I discuss only four categories. Of critical importance is the fact that these coping skills are learned, not innate; they are processes that are not automatic and may require conscious effort.

Long lists of coping skills could be developed, and much could be made of the differences between coping traits and coping styles. For this article, only four categories of coping skills are mentioned. These are of greatest importance for the health care concepts and research discussed below. The first category of coping skills is *knowledge*, knowledge of the world we live in. How does the world function? What are the levers and pulleys and pressures and resistances that determine the ebb and flow of the world around us?

What one knows affects one's health, one's well-being, even how long one lives. The more an individual knows about the surrounding world, the more that person is able to understand, control, and deal effectively with it. Facts help a person cope better with the environmental demands being faced. Perhaps even more important than the actual use of facts in dealing with events in the world is the attitude that accompanies the acquisition of knowledge. With knowledge, information, comes an empowerment, a belief that the world is understandable, controllable, and friendly. Perhaps the most stressful situation is the ambiguity that comes from an awareness that one has inadequate and incomplete information.

Knowledge is very difficult to measure, but if one substitutes years of education—on the assumption that more years of exposure to the educational process relate in some positive way to the amount of learning and thus to knowledge acquired—one should predict that increased education relates to better health and a decreased mortality (increased longevity).

Indeed, there is a very direct, linear relationship—for both men and women: As the years of education increase from grammar school to college postgraduate level, the mortality rate declines (Kitagawa & Hauser, 1973). There are many possible explanations for this relationship, and the true one will probably be a combination of multiple variables (Pincus, Esther, DeWalt, & Callahan, 1998).

The second class of coping skills, which I have named *inner resources,* is a set of beliefs each of us acquires in the process of growing up. Inner resources are not facts—they are beliefs, assumptions, and predictions. The best known example of this is the question posed to every child at some age about a glass filled to the midpoint: "Is the glass half full or half empty? How do you see the world?" Comprehensive theories have been developed and researched that fit under the rubric of inner resources. Vaillant and Mukamal (2001) spoke of "involuntary mental mechanisms that adaptively alter inner or outer reality in order to minimize distress" (p. 840). Both Rotter's (1966) internal/external locus of control and Seligman's explanatory styles approach (Kamen & Seligman, 1989) fit in here.

The third class of coping skills, *social support*, refers to the interpersonal relationships that we have formed and nurture. One of the major sections of this article focuses directly on studies in this area. In general, the conclusion is that for individuals, the larger the social support system is, the lower the mortality rate (House, Landis, & Umberson, 1988).

The final category of coping skills is *spirituality.* Twenty years ago, spirituality and religion were fringe components in psychology and health care. Better questions, better methodologies, and a shift in the assumptions that underlie the behavioral sciences have brought spirituality (including religious beliefs) almost into the mainstream and certainly into our journals (Sloan & Bagiella, 2001).

A special section titled "Spirituality, Religion, and Health" (Miller & Thoresen, 2003a) in the January 2003 issue of the *American Psychologist* should greatly increase interest and research activity in this area because "here is a genuine frontier for research, one in which psychologists have both much to offer and much to learn" (Miller & Thoresen, 2003b, p. 33). An article in the April 2003 issue of *Academic Medicine* (Scheurich, 2003) commented that "the role of spirituality in medical practice has sparked burgeoning interest in recent years" (p. 356) and discussed the need for "a broad understanding of the roles of meaning and belief" (p. 360) in training and education.

One study looked at the variables that influenced mortality in men over 55 who had elective cardiac surgery (Oxman, Freeman, & Manheimer, 1995). Two of the top five predictors of six-month mortality are variables of interest—social support and religious support. Those who professed no strength or comfort from religion were three times as likely to die in this six-month period as those who said they drew strength and comfort from religion. Those who did not participate in group activities were four times more likely to die than those who did.

Group participation and support and comfort from religious beliefs were measured with a paper-and-pencil test prior to surgery. About 25% of those individuals who indicated no group participation and also no comfort or strength from their religious beliefs died in the six months following surgery. Among those who indicated both group participation and strength and comfort from religious beliefs, only 4% died in the first six months after surgery. In another study, religious struggle—Does God love me?—predicted a greater risk of death in medically ill elderly patients (Pargament, Koenig, Tarakeshwar, & Hahn, 2001).

These four categories of coping skills—knowledge, inner resources, social support, and spiritual beliefs—are not easily quantified or measured, but some attempts have been made and are reflected in many of the studies referred to in this article. A similar problem exists for life (environmental) demands. There have been some major steps in this area, such as the Critical Life Events Scale (Cohen, Kessler, & Underwood, 1995; Holmes & Rahe, 1967). It is a truism, however, that what one person sees as an insurmountable demand is welcomed as an interesting challenge by another, while not even recognized as a unique situation by a third.

Stress and Upper Respiratory Illness

In one study (Cohen et al., 1991) of the relationship between stress, infection, and illness, young adult volunteers were quarantined for three days—to ensure that they were not harboring any common cold virus—before nasal ad-

ministration of one of five rhinoviruses or a placebo. Still in isolation, the participants were monitored—via physician inspection and daily throat swabs—to determine if the viruses were replicating. The development of illness symptoms was also monitored by physician exam, self-report, and, for example, weight of mucus-laden nasal tissues. High concordance was found for measures of both infection (viruses' replication) and illness (symptoms).

Prior to quarantine, paper-and-pencil tests were administered to the participants to measure three stress-related variables: perceived stress, negative affect, and number of stressful life events in the past year. Perceived stress was defined as the degree to which an individual feels able to cope with current life demands. Negative affect was defined as the degree to which an individual feels unhappy or anxious about himself or herself. Stressful life events were measured as the number of major stressful events experienced by the individual in the past year. Scores for all three were combined to provide a single stress-measure score, and this variable is plotted on the *x*-axis of Figures 2A and 2B. No differences were reported among the five virus strains, so all data are grouped together. As the stress measure increased from low to high, the percentage of participants with replicating viruses (infection) increased from the low 70s to the low 90s (Figure 2A). The percentage of participants with cold symptoms also increased as their stress levels increased from about 27% to 47%—Figure 2B—although fewer individuals showed illness than were infected.

Subsequent analysis of these data (Cohen, Tyrrell, & Smith, 1993) distinguished those who would (above the median in negative affect and in perceived stress) and those who would not become infected (below the median), but these two variables did not predict those who would become ill. Those participants with stressful life events greater than the median were more likely to develop illness. That information is shown graphically in Figure 3, which provides an algorithm for the development of an upper respiratory illness. These results have been validated in part by research reported by independent investigators (Stone et al., 1992).

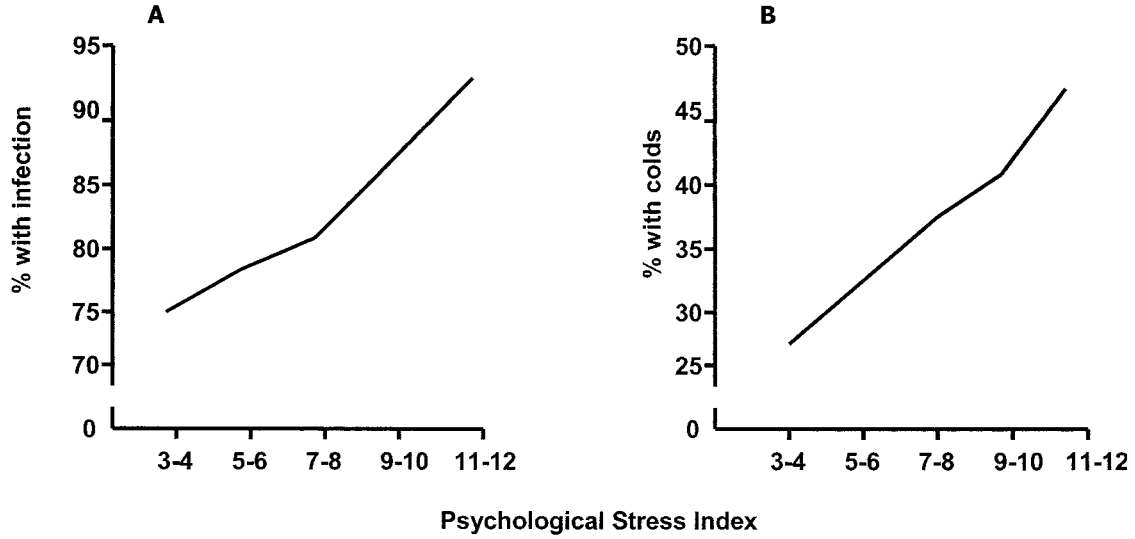
Several later studies have both expanded and clarified the positive correlation between high stress and the increased probability of an upper respiratory infection (Cohen, 1996; Takkouche, Regueira, & Gestal-Otero, 2001). Cohen has presented evidence that it may be the pro-inflammatory cytokine IL-6 that mediates the increase in upper respiratory illness symptoms in infected high-stress-level individuals (Cohen, Doyle, & Skoner, 1999).

Psychotherapy, Beliefs, and Physical Illness

Talking about problems and anxieties makes people feel better, function better, and experience fewer psychological symptoms (Seligman, 1996; Smith & Glass, 1977). James Pennebaker (1990) initiated a series of studies using the

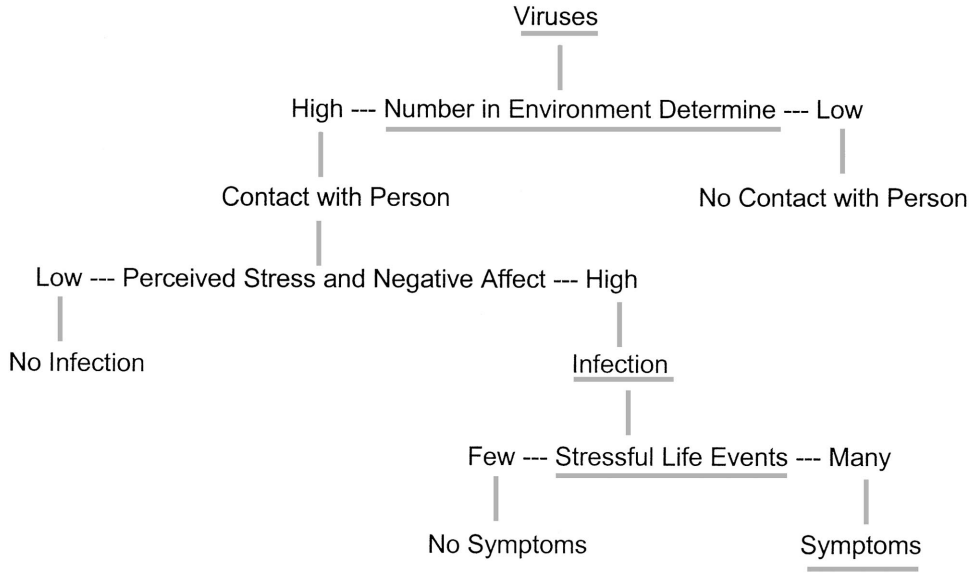
Figure 2

Observed Relationship Between the Psychological Stress Index and (A) Rate of Infection and (B) Rate of Clinical Colds



Note. From "Psychological Stress and Susceptibility to the Common Cold," by S. Cohen, D. A. Tyrrell, & A. P. Smith, 1991, *New England Journal of Medicine, 325,* p. 609. Copyright 1991 by the Massachusetts Medical Society. Reprinted with permission.

Figure 3
Algorithm for the Possible Development of an Upper Respiratory Illness



Note. Algorithm graphed from data presented in Cohen, Tyrrell, and Smith (1993). High–low is median split of pencil-and-paper test scores.

technique of asking students to anonymously either write or talk into a tape recorder for 20 minutes a day on four consecutive days. They were either to write or to speak about trivial things—for instance, the room they were in—or about a personal traumatic experience, focusing on their emotions.

"Writing about their deepest thoughts and feelings about traumas resulted in improved moods, more positive outlook, and greater physical health" (Pennebaker, 1990, p. 45). Furthermore,

> the individuals who showed the greatest health improvements were those who wrote about topics that they had actively held back from telling others. . . . The present findings . . . suggest that the disclosure of traumas is simultaneously associated with improvement in certain aspects of immune function and physical health. (Pennebaker & Kiecolt-Glaser, 1988, pp. 244–245)

The amount and sophistication of research in this field are increasing rapidly (Kelly, 1999).

Many questions remain, including whether psychotherapy and an individual's beliefs can influence the course of a major physical illness such as cancer (Eells, 2000). One study began with the hypothesis that "the psychological stance which patients adopt when they develop cancer can, in some cases, influence the course of their disease" (Greer, 1991, p. 43). The participants were women with breast cancer who had received a simple mastectomy. Three months after the surgery, when the researchers assumed the acute reaction to the diagnosis and the surgery would perhaps have subsided, they interviewed each woman to find out what having cancer implied to her, and what she had thought and done about the threat of cancer.

Of major importance was the finding that at the 5-, 10-, and 15-year follow-ups, the best single predictor of death (from any cause, including breast cancer) or recurrence of cancer was the psychological response of each woman three months after surgery. Her mental attitude three months after surgery better predicted the likelihood of dying or having a recurrence of cancer than did the size of her tumor, the tumor's histologic grade, or her age. The 15-year follow-up results are straightforward: Women who showed fighting spirit ("I'm going to beat this") or denial ("I never had cancer, the doctor took off my breast as a precaution") had a 50% chance of surviving 15 years in good health. Women with the other three attitudes (stoic acceptance, hopelessness, anxious preoccupation) had about a 15% chance of surviving 15 years.

A recent study (Watson, Haviland, Greer, Davidson, & Bliss, 1999) followed a larger number of women with early stage breast cancer for five years and reported that their paper-and-pencil measure of fighting spirit "was not associated with improved survival" (p. 1335) but that "patients who had a high score on the helpless measure at baseline were more likely to have relapsed or died during the 5 years" (p. 1335).

In an area as new and complex as this, with different measures of the psychological variables and ever-increasing sophistication of the biological measures, it is not surprising that there is not unanimity in study results. A comment on the differences between the Greer (1991) and Watson et al. (1999) studies concluded:

> One curious aspect of these divergent findings is that helplessness/hopelessness, which does matter, seems on the surface at

least to be an opposite of fighting spirit, which does not matter. Put another way, it appears that while fighting spirit makes no difference, a possible opposite makes things worse. (Harris Dienstfrey, as quoted in "Investigations," 2000, p. 118)

More data and better measures are needed to settle this issue, but at one level, it is amazing that any attitude can have a major effect on survival. There are, however, many reports that fit with this belief (Reed, Kemeny, Taylor, Wang, & Visscher, 1994; Solomon, Temoshok, O'Leary, & Zich, 1987). To increase the probability and the duration of one's survival when confronted with a major medical illness, one should follow the Norman Cousins rule: "Don't deny the diagnosis, just defy the verdict that is supposed to go with it" (Cousins, 1989, p. 26).

A small longitudinal, prospective study (Cunningham et al., 2000) of patients with medically incurable metastatic cancer of different types supported that rule. It showed that patients who demonstrated high involvement in the psychological work of group therapy survived three times longer than patients with low involvement.

Two studies (Grossarth-Maticek & Eysenck, 1989; Spiegel, Kraemer, Bloom, & Gottheil, 1989) looked at psychotherapy and cancer survival rates. Both showed a positive effect, but the Spiegel et al. (1989) study serves to illustrate the point. All of the women in it were diagnosed with metastatic breast cancer and received chemotherapy. They were assigned randomly to receive group therapy or not. One year of weekly 90-minute group therapy sessions for these women almost doubled their survival time. When all other conditions and treatments were identical, those women who received group therapy survived an average of 36.6 months, compared with an average of 18.9 months for those who did not participate in group therapy. A 2001 study (Goodwin et al., 2001) using a similar paradigm did not find increased survival in the women in the support group but did find that their reported quality of life was better. More research should help parse the issue (Helgeson, Cohen, Schulz, & Yasko, 2000; Spiegel, 2001).

Social Support, Health, and the Chance of Dying

An early study (Berkman & Syme, 1979) explored the relationship between the size and type of an individual's social network and that individual's health and chance of dying. This study asked simple questions about personal habits, life experiences, and backgrounds of almost 7,000 people in Alameda County, California, who were followed over a nine-year period. Also measured were social relationships in four different areas: marriage, friends and relatives, church membership and involvement, and other group memberships. When all other factors were controlled (e.g., smoking, weight, etc.), the probability of an individual's death over the nine years was related to the size of his or her social support system.

All four social areas studied were important, but most important in predicting mortality was being active with friends and relatives. One mental health professional said it well: "So many people are ashamed to admit they're lonely, that they need companionship, love, that they're not self-sufficient. . . . Our hospitals are filled with the 'casualties' of loneliness" (James J. Lynch, as quoted in Shubin, 1978, p. 3). Mother Teresa said it best: "Being unwanted is the worst disease that any human being can ever experience" (as quoted in Muggeridge, 1997, p. 17).

One review of 50 studies found "that individuals with high levels of social support had lower blood pressure than individuals with lower levels of social support" (Uchino, Uno, & Holt-Lunstad, 1999, p. 146), and a review of 19 studies suggested "that individuals with high levels of social support had stronger natural killer cell responses (i.e., ability to kill susceptible tumor cells) than individuals with lower levels of social support" (Uchino et al., 1999, p. 147). A comment by David Spiegel stated that "the strength of this relationship [between social support and mortality] is as great as that between high serum cholesterol and mortality or between smoking and mortality" (Spiegel, 1994, p. 12).

No one is sure why or how increased social interaction decreases mortality, but it does for most people. Perhaps the reason is that having more friends helps an individual to deal better with the stresses and anxieties of life. Alternatively, the reason could be that being surrounded by people who care about us and for whom we care convinces us to increase our health-producing behaviors. The study of critical variables continues (Cohen, Gottlieb, & Underwood, 2001; Uchino et al., 1999; Vitaliano et al., 2001).

Death of a Spouse and Death of the Survivor

Building and maintaining close relationships are positive health habits and tie into decreased mortality. Perhaps the closest relationship many people build is in a marriage. Many have spoken of an individual's spouse as his or her best friend. A National Institutes of Health (NIH) report (Berman & Larson, 1994) commented on the 700,000 individuals over the age of 50 who die each year, saying that 35,000 die in the year following their spouse's death. The report concluded that one fifth of those first-year deaths are the direct result of the loss of the spouse. The report also stated that "the mortality of the surviving spouse during the first year of bereavement has been found to be 2 to 12 times that of married people the same age" (Berman & Larson, 1994, p. 5).

One study of more than 4,000 White men and women who became widowed during a 12-year period matched them with married persons of the same age, sex, race, and place where they lived (Helsing, Szklo, & Comstock, 1981). Two things made this study stand out: (a) The lifestyles of the widowed and married groups were matched, and (b) the individuals were followed over a long time. Statistical analysis controlled for the effects of age, cigarette smoking, and education, as well as age at first marriage, church attendance, and socioeconomic level. The question asked was whether there were differences in mortality rates between those who had been widowed and those who had not been widowed.

The results were clear. When a man's wife died, his own probability of death increased 25%. However, when a woman's husband died, her mortality rate increased less than 5%. In this study, the effects of a broken heart were more than five times greater for men than for women.

Losing a wife or a close relative (Rees & Lutkins, 1967) through death does have a negative effect on health and predicts an earlier death more for men than for women (Clayton, 1974). The same is true for divorce (Kiecolt-Glaser et al., 1987). A study on the interaction of gender, social support, and cardiovascular response to stress concluded that "married men are healthier because they marry women. Women do not profit as much from marriage or suffer as much from separation . . . because the support they gain or lose is the less effective support of a man" (Glynn, Christenfeld, & Gerin, 1999, p. 234).

The Will to Live

Newspaper reports of sudden deaths and miraculous survivals appear so frequently that we can no longer ignore the possibility that our thoughts can influence our survival. Our minds have that power. Some fatal heart attacks and other sudden deaths result from an individual's response to a significant psychological situation—good or bad. One article commented that "many studies have found an increase in morbidity or mortality associated with personally significant symbolic occasions" (Phillips, Van Voorhees, & Ruth, 1992, p. 532).

All of us have at least one event that has personal symbolic meaning: our birthdays. Few people forget their birthdays or fail to mark them in some special way. Could a person postpone his or her death for an upcoming birthday? Several studies have looked at death from natural causes and its relationship to birthdays. The other variable studied has been the level of success achieved by individuals.

One way to study the success–birthday–death relationship is to look at the date of death for individuals for whom birthdays are a positive experience and a day to reflect with pride on their achievements. Famous individuals might accord special significance to their birthdays. Parties, recognition, and congratulatory messages from other prominent people may make their birthdays something to look forward to. However, our question is whether their birthdays are events for which to live: Is there evidence that famous people wait until after their birthdays to die?

Several studies have looked at the deaths of important men. One (Phillips, 1972) reported actual deaths as a percentage of expected deaths. In this study, death was considered to be a random event throughout the year. The percentage of deaths expected every month was 100% divided by 12, or 8.3% a month. Results for three groups of well-known men—the very famous (e.g., George Washington, Thomas Edison), the not so famous (e.g., John Hancock, Edgar Allan Poe), and the least famous (e.g., Rutherford B. Hayes, Nikola Tesla)—were obtained. Levels of fame were determined by how often the person's name appeared in two sets of biographies written for children.

The results showed that fewer famous men died in the month before their birthday month than would be expected if death were a random event. The more famous the men were, the less likely they were to die in this period. Of the very famous, only 22% of the expected number died in the month before their birth month. For the not so famous and the least famous, the percentages were 37% and 80%, respectively. In other words, the most famous were five times less likely to die in the month before their birthdays than the average person.

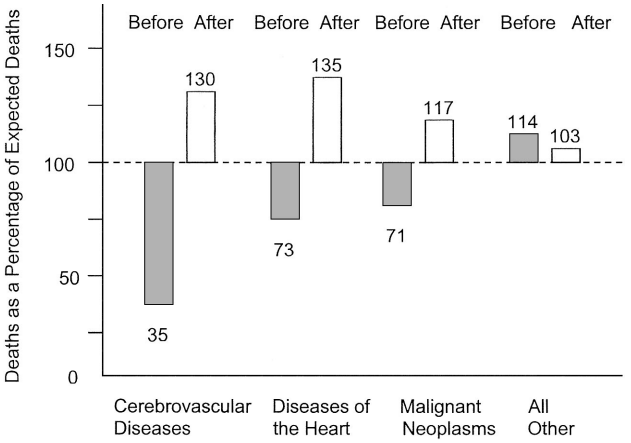
Shifting to a different type of personally significant occasion, one report looked at the patterns of death over an 18-year period of a large number of men around the Jewish holiday of Passover (Phillips & King, 1988). Because Passover is a major family celebration led by the head of the household, it has traditionally had special significance for Jewish men. The evidence from the study showed overwhelmingly that Jewish men "delayed" their deaths until after this event of personal significance.

This study (Phillips & King, 1988) compared two very brief time periods—the week before and the week after Passover. Passover is a social as well as a religious event. When the first day of Passover occurs on a weekend, social importance increases because it is more likely that friends and family will gather together. The death rate of Jewish men around weekend Passovers showed a 24% decrease in the week before a weekend Passover and a 24% corresponding increase in the week after Passover. No change was observed in the death rate before or after Passover among Jewish women, young Jewish children, Black adults, or Asian adults.

A similar study looked at deaths in the week before and the week after the Chinese Harvest Moon Festival (Phillips & Smith, 1990). The Harvest Moon Festival has special symbolic meaning for a specific group of individuals—elderly Chinese women. This is the major opportunity in the year for elderly women to be the center of attention and activity. Over a 25-year period, mortality from natural causes in Chinese women age 75 years or older dropped by more than one third in the week before the Harvest Moon Festival and increased in the week after by 35%. That increase and decrease of deaths did not appear in younger Chinese women or in other groups of individuals living in the same area and in the same period of time.

These studies suggest that the will to live is an important part of staying alive. More than that, these studies show that our minds are powerful in determining life and death, health and well-being. All the evidence points to the same conclusion: When an event that is important to an individual is coming up in the near future, it seems possible for some people to delay death until after the significant date has occurred. Not all types of deaths can be delayed, however. In fact, for Jewish men, Figure 4 shows that the decrease before and the increase after the significant event (Passover) occurred in only three classes of natural deaths: cerebrovascular diseases (strokes), diseases of the heart (heart attacks), and malignant neoplasms (cancers). Deaths

Figure 4
Type of Illness Causing Death in Unambiguously Jewish-Named Men in the Week Before and the Week After Passover



Note. Calculated from data in Phillips and King (1988, Table III).

due to infections, for example, were not affected (Phillips & Smith, 1990).

The same three causes of death also shaped the incidence of death for elderly Chinese women around the Harvest Moon Festival. These are the three leading causes of death in the United States and are responsible for about 60% of all deaths. Our thoughts appear to have a special impact on these three conditions, which seem to be readily influenced by our belief systems.

The power that our thoughts have on the body is not magic. The mind–body connection is supported by the very best of modern-day research, and each year, we learn more and more about how this connection works. It is very clear that what one thinks and believes affects one's health, one's well-being, and even one's chances of dying.

Discussion

We already know from studies presented here and from other reviews (Dienstfrey, 2001) that what we believe, what we think, has both positive and negative effects on our physical health. The challenge for psychological science is to determine (a) to what extent this is true and (b) the psychobiological mechanisms.

We have had stories for 2,000 years. The tale of Ananias and his wife being frightened to death when they believed God knew they had lied to Him (Acts 5:1–10, King James Version) has its modern-day counterpart in the reports of the impact of the random Iraqi missile attacks on Israel. "During the first days of the Gulf War we noted a sharp rise in the incidence of acute MI [heart attacks] and sudden death in our area compared with the five control periods" (Meisel et al., 1991, p. 660; see also Kark, Goldman, & Epstein, 1995).

As the complexity of mind–body situations increases, so does the difficulty of analysis and of the identification of mechanisms. A final study provides examples of complex mind–body–culture interactions. It directly addressed the issue of whether a set of beliefs can hasten the occurrence of death. This study (Phillips, Ruth, & Wagner, 1993) looked at Chinese Americans with different levels of conviction regarding Chinese culture and astrology. Two basic beliefs in Chinese astrology were most relevant. The first belief is that a person's fate is strongly influenced by the astrological year of his or her birth; the second is that each astrological year is associated with a body organ or type of illness or symptom.

When a believer in these concepts develops the illness associated with his or her birth year, that person believes that his or her belief system has been confirmed and that an early death is probable. This study (Phillips et al., 1993) asked the simple question, When an individual committed to this astrological system develops an illness that is associated with his or her birth year, does that person die sooner than individuals with the same illness who were born in a different astrological year or who have a lesser degree of commitment to the belief system? The evidence was clear: Such people do, indeed, die sooner. The results were summarized as follows:

> Chinese-Americans, but not Whites, die significantly earlier than normal (1.3 to 4.9 yr) if they have a combination of disease and birthyear which Chinese astrology and medicine consider ill-fated. The more strongly a group is attached to Chinese traditions, the more years of life are lost. Our results hold for nearly all major causes of death studied. (Phillips et al., 1993, p. 1142)

In other words, up to five years of life could be lost because of a belief system. Believing that control is out of one's hands leads to bad health consequences. As the authors of this study said, "When people contract a disease which is associated with the phase of their birthyear, they may be more likely than others to feel helpless, hopeless, and stoic" (Phillips et al., 1993, p. 1142), and they may die earlier than an individual with the same disease born in a different year.

Conclusion

This developing model of health and illness, called the biopsychosocial model, provides the concepts and the components to change the way we view much of the world. The components are the neurotransmitters, hormones, and cytokines that act as messenger molecules carrying information between the nervous, endocrine, and immune systems. The concepts include two very basic ones: (a) The thought processes are the functioning of the brain, and (b) as we change our minds (our thoughts), we change our brains and therefore our bodies.

Some believe that "recent research provides compelling evidence of mind–brain–body interactions at the organismal, cellular, and molecular level that can impact on the health and quality of life of individuals" (Straus, 2001). The associate director of behavioral and social sciences research at NIH has stated that "we know that at least half of all deaths in the United States have behavioral and social

factors as significant causes" (Raynard S. Kington, as quoted in Carpenter, 2001, p. 78).

The hard work of designing and executing studies and of identifying relationships and showing mechanisms that will allow us to go beyond phenomenology has started but is mostly still to come. The consequences of shifting to this new paradigm and obtaining a clearer and better understanding of the interactions among the components of the biopsychosocial model will be beneficial to individuals, government policymakers, and religious and social leaders, as well as to the behavioral sciences and all who work in the broad area of health care.

REFERENCES

Abrams, R. M. (1978). *The burdens of progress, 1900–1929.* Glenview, IL: Scott, Foresman.

Andreasen, N. C. (1997, March 14). Linking mind and brain in the study of mental illnesses: A project for a scientific psychopathology. *Science, 275,* 1586–1593.

Azar, B. (2001, December). A new take on psychoneuroimmunology. *Monitor on Psychology, 32*(11), 34–36.

Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology, 109,* 186–204.

Berman, B. M., & Larson, D. B. (1994). *Alternative medicine: Expanding medical horizons.* Washington, DC: U.S. Government Printing Office.

Bremner, J. D. (1999). Does stress damage the brain? *Biological Psychiatry, 45,* 797–805.

Carpenter, S. (2001, November). Curriculum overhaul gives behavioral medicine a higher profile. *Monitor on Psychology, 32*(10), 78–79.

Cherry, L. (1980, November 23). How the mind affects our health. *New York Times Magazine,* pp. 94–96.

Chiles, J. A., Lambert, M. J., & Hatch, A. L. (1999). The impact of psychological interventions on medical cost offset: A meta-analytic review. *Clinical Psychology: Science and Practice, 6,* 204–220.

Chiong, W. (2001). Diagnosing and defining disease. *JAMA, 285,* 89–90.

Clayton, P. J. (1974). Mortality and morbidity in the first year of widowhood. *Archives of General Psychiatry, 30,* 747–750.

Cohen, S. (1996). Psychological stress, immunity, and upper respiratory infections. *Current Directions in Psychological Science, 5*(3), 86–89.

Cohen, S., Doyle, W. J., & Skoner, D. P. (1999). Psychological stress, cytokine production, and severity of upper respiratory illness. *Psychosomatic Medicine, 61,* 175–180.

Cohen, S., Gottlieb, B. H., & Underwood, L. G. (2001). Social relationships and health: Challenges for measurement and intervention. *Advances in Mind–Body Medicine, 17,* 129–141.

Cohen, S., Kessler, R., & Underwood, L. G. (Eds.). (1995). *Measuring stress.* New York: Oxford University Press.

Cohen, S., Tyrrell, D. A., & Smith, A. P. (1991). Psychological stress and susceptibility to the common cold. *New England Journal of Medicine, 325,* 606–612.

Cohen, S., Tyrrell, D. A., & Smith, A. P. (1993). Negative life events, perceived stress, negative affect, and susceptibility to the common cold. *Journal of Personality and Social Psychology, 64,* 131–140.

Cousins, N. (1989). Belief becomes biology. *Advances in Mind–Body Medicine, 6,* 20–29.

Cummings, N. A. (1999). Medical cost offset, meta-analysis, and implications for future research and practice. *Clinical Psychology: Science and Practice, 6,* 221–224.

Cunningham, A. J., Phillips, C., Lockwood, G. A., Math, M., Headley, D. W., & Edmonds, C. V. I. (2000). Association of involvement in psychological self-regulation with longer survival in patients with metastatic cancer: An exploratory study. *Advances in Mind–Body Medicine, 16,* 276–294.

Dantzer, R. (2001). Can we understand the brain and coping without considering the immune system? In D. M. Broom (Ed.), *Coping with challenge: Welfare in animals including humans* (Vol. 7, pp. 102–110). Berlin, Germany: Dahlem University Press.

De Kruif, P. (1926). *Microbe hunters.* New York: Harcourt, Brace.

Dienstfrey, H. (2001). An *Advances* forum: The state of the science—The best evidence for the involvement of thoughts and feelings in physical health. *Advances in Mind–Body Medicine, 17,* 2–59.

Dubos, R. J. (1955). Unsolved problems in the study and control of microbial diseases. *JAMA, 157,* 1477–1479.

Eells, T. D. (2000). Can therapy affect physical health? *Journal of Psychotherapy Practice and Research, 9,* 100–104.

Eysenck, H. J. (1991). Personality, stress, and disease: An interactionist perspective. *Psychological Inquiry, 2,* 221–232.

Frenk, J. (1998). Medical care and health improvement: The critical link. *Annals of Internal Medicine, 129,* 419–420.

Friedman, H. S., & Booth-Kewley, S. (1987). The disease-prone personality: A meta-analytic view of the construct. *American Psychologist, 42,* 539–555.

Frishman, R. (1996). Quality care: Don't be a wimp in the doctor's office. *Harvard Health Letter, 21*(10), 1.

Glynn, L. M., Christenfeld, N., & Gerin, W. (1999). Gender, social support, and cardiovascular responses to stress. *Psychosomatic Medicine, 61,* 234–242.

Goodwin, P. J., Leszcz, M., Ennis, M., Koopmans, J., Vincent, L., Guther, H., et al. (2001). The effect of group psychosocial support on survival in metastatic breast cancer. *New England Journal of Medicine, 345,* 1719–1726.

Greer, S. (1991). Psychological response to cancer and survival. *Psychological Medicine, 21,* 43–49.

Grol, R. (2001). Improving the quality of medical care. *JAMA, 286,* 2578–2601.

Grossarth-Maticek, R., & Eysenck, H. J. (1989). Length of survival and lymphocyte percentage in women with mammary cancer as a function of psychotherapy. *Psychological Reports, 65,* 315–321.

Haggerty, R. J. (1980). Life stress, illness and social supports. *Developmental Medicine and Childhood Neurology, 22,* 391–400.

Hahn, R. (1987). *Sickness and healing: An anthropological perspective.* New Haven, CT: Yale University Press.

Helgeson, V. S., Cohen, S., Schulz, R., & Yasko, J. (2000). Group support interventions for women with breast cancer: Who benefits from what? *Health Psychology, 19,* 107–114.

Helsing, K. J., Szklo, M., & Comstock, G. W. (1981). Factors associated with mortality after widowhood. *American Journal of Public Health, 71,* 802–809.

Holms, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research, 11,* 213–218.

House, J. S., Landis, K. R., & Umberson, D. (1988, July 29). Social relationships and health. *Science, 241,* 540–545.

Investigations: A new study (Watson et al.) on "fighting spirit" and breast cancer. (2000). *Advances in Mind–Body Medicine, 16,* 118–127.

Jacobs, M. A., Spilken, A., & Norman, M. (1969). Relationship of life change, maladaptive aggression, and upper respiratory infection in male college students. *Psychosomatic Medicine, 31,* 31–43.

Justice, B. (1994). Critical life events and the onset of illness. *Comprehensive Therapy, 20,* 232–238.

Kamen, L., & Seligman, M. E. P. (1989). Explanatory style and health. *Current Psychological Research and Reviews, 6,* 207–218.

Kandel, E. (1998). A new intellectual framework for psychiatry. *American Journal of Psychiatry, 155,* 457–469.

Kark, J. D., Goldman, S., & Epstein, L. (1995). Iraqi missile attacks on Israel: The association of mortality with a life-threatening stressor. *JAMA, 273,* 1208–1210.

Keller, S. E., Shiflett, S. C., Schleifer, S. J., & Bartlett, J. A. (1994). *Human stress and immunity.* San Diego, CA: Academic Press.

Kelly, A. E. (1999). Revealing personal secrets. *Current Directions in Psychological Science, 8*(4), 105–109.

Kemeny, M. E., & Laudenslager, M. L. (1999). Beyond stress: The role of individual difference factors in psychoneuroimmunology. *Brain, Behavior, and Immunity, 13,* 73–75.

Kiecolt-Glaser, J. K., Fisher, L. D., Ogrocki, P., Stout, J. C., Speicher, C. E., & Glaser, R. (1987). Marital quality, marital disruption, and immune function. *Psychosomatic Medicine, 49,* 13–34.

Kiecolt-Glaser, J. K., & Glaser, R. (1987). Psychosocial moderators of immune function. *Journal of Behavioral Medicine, 9*(2), 16–20.

Kitagawa, E. M., & Hauser, P. M. (1973). *Differential mortality in the*

United States: A study in socioeconomic epidemiology. Cambridge, MA: Harvard University Press.
Koch, A. (2001). Acute respiratory tract infections and mannose-binding lectin insufficiency during early childhood. *JAMA, 285,* 1316–1321.
Kubzansky, L. D., Sparrow, D., Vokonas, P., & Kawachi, I. (2001). Is the glass half empty or half full? A prospective study of optimism and coronary heart disease in the Normative Aging Study. *Psychosomatic Medicine, 63,* 910–916.
Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.
Maier, S. F., Watkins, L. R., & Fleshner, M. (1994). The interface between behavior, brain, and immunity. *American Psychologist, 49,* 1004–1017.
Maruta, T., Colligan, R. C., Malinchoc, M., & Offord, K. P. (2000). Optimists vs. pessimists: Survival rate among medical patients over a 30-year period. *Mayo Clinic Proceedings, 75,* 140–143.
McEwen, B. S. (1999). Allostasis and allostatic load: Implications for neuropsychopharmacology. *Neuropsychopharmacology, 23,* 108–124.
McEwen, B. S. (2002). *The end of stress as we know it.* Washington, DC: Joseph Henry Press.
McKinlay, J. B., & McKinlay, S. M. (1981). Medical measures and the decline of mortality. In P. Conrad & R. Kern (Eds.), *The sociology of health and illness: Critical perspectives* (pp. 12–30). New York: St. Martin's Press.
Meisel, S. R., Kutz, I., Dayan, K. I., Pauzner, H., Chetboun, I., Arbel, Y., et al. (1991). Effect of Iraqi missile war on incidence of acute myocardial infarction and sudden death in Israeli civilians. *Lancet, 338,* 660–661.
Merrill, J. M., Camacho, Z., Laux, L. F., Thornby, J. I., & Vallbona, C. (1991). How medical school shapes students' orientation to patients' psychological problems. *Academic Medicine, 66*(9), S4–S6.
Miller, W. R., & Thoresen, C. E. (Eds.). (2003a). Spirituality, religion, and health [Special section]. *American Psychologist, 58,* 24–63.
Miller, W. R., & Thoresen, C. E. (2003b). Spirituality, religion, and health: An emerging research field. *American Psychologist, 58,* 24–35.
Muggeridge, M. (1997, September 9). In a 1968 BBC interview: "Being unwanted is the worst disease." *Daily Telegraph,* p. 17.
Oxman, T. E., Freeman, D. H., Jr., & Manheimer, E. D. (1995). Lack of social participation or religious strength and comfort as risk factors for death after cardiac surgery in the elderly. *Psychosomatic Medicine, 57,* 5–15.
Pargament, K. I., Koenig, H. G., Tarakeshwar, N., & Hahn, J. (2001). Religious struggle as a predictor of mortality among medically ill elderly patients: A 2-year longitudinal study. *Archives of Internal Medicine, 161,* 1881–1885.
Pennebaker, J. W. (1990). *Opening up: The healing power of confiding in others.* New York: Morrow.
Pennebaker, J. W., & Kiecolt-Glaser, J. K. (1988). Disclosure of traumas and immune function: Health implications for psychotherapy. *Journal of Consulting and Clinical Psychology, 56,* 239–245.
Phillips, D. P. (1972). Deathday and birthday: An unexpected connection. In J. M. Tanur (Ed.), *Statistics: A guide to the unknown* (pp. 52–65). San Francisco: Holden-Day.
Phillips, D. P., & King, E. W. (1988). Death takes a holiday: Mortality surrounding major social occasions. *Lancet, 2,* 728–732.
Phillips, D. P., Ruth, T. E., & Wagner, L. M. (1993). Psychology and survival. *Lancet, 342,* 1142–1145.
Phillips, D. P., & Smith, D. G. (1990). Postponement of death until symbolically meaningful occasions. *JAMA, 263,* 1947–1951.
Phillips, D. P., Van Voorhees, C. A., & Ruth, T. E. (1992). The birthday: Lifeline or deadline? *Psychosomatic Medicine, 54,* 532–542.
Pincus, T. (2000). Challenges to the biomedical model: Are actions of patients almost always as important as actions of health professionals in long-term outcomes of chronic diseases? *Advances in Mind–Body Medicine, 16,* 287–294.
Pincus, T., Esther, R., DeWalt, D. A., & Callahan, L. F. (1998). Social conditions and self-management are more powerful determinants of health than access to care. *Annals of Internal Medicine, 129,* 406–416.
Prioreschi, P. (1991). *A history of medicine: Vol. 1. Primitive and ancient medicine.* New York: Edwin Mellen Press.
Raison, C. L., & Miller, A. H. (2001, October). The neuroimmunology of stress and depression. *Seminars in Clinical Neuropsychiatry, 6*(4), 277–294.
Ray, O., & Ksir, C. (2004). *Drugs, society, and human behavior* (10th ed.). New York: McGraw-Hill.
Reed, G. M., Kemeny, E., Taylor, S. E., Wang, H. Y., & Visscher, B. R. (1994). Realistic acceptance as a predictor of decreased survival time in gay men with AIDS. *Health Psychology, 13,* 299–307.
Rees, W. D., & Lutkins, S. G. (1967). Mortality of bereavement. *British Medical Journal, 4,* 13–16.
Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80*(Whole No. 609).
Sagan, L. (1987). *The health of nations: True causes of sickness and well-being.* New York: Basic Books.
Scheurich, N. (2003). Reconsidering spirituality and medicine. *American Medicine, 78,* 356–360.
Seligman, M. E. P. (1996, July). Long-term psychotherapy is highly effective: The *Consumer Reports* study. *Harvard Mental Health Letter, 21,* 5–7.
Shine, K. I. (2002). Health care quality and how to achieve it. *Academic Medicine, 77,* 91–99.
Shubin, S. (1978). Can loneliness be lethal? *Today in Psychiatry, 4*(3), 3.
Sloan, R. P., & Bagiella, E. (2001). Religion and health. *Health Psychology, 20,* 228.
Smith, M. L., & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome studies. *American Psychologist, 32,* 752–760.
Sobel, D. S. (2000). Mind matters, money matters: The cost-effectiveness of mind/body medicine. *JAMA, 284,* 1705.
Solomon, G. F., Temoshok, L., O'Leary, A., & Zich, J. (1987). An intensive psychoimmunologic study of long-surviving persons with AIDS. *Annals of the New York Academy of Sciences, 496,* 647–655.
Spiegel, D. (1994, March 4). Paying more attention to the interaction of mind and body could reduce health care costs, improve quality of life. *Psychiatric News, 29*(5), 12.
Spiegel, D. (2001). Mind matters—Group therapy and survival in breast cancer. *New England Journal of Medicine, 345,* 1767–1768.
Spiegel, D., Kraemer, H. C., Bloom, J. R., & Gottheil, E. (1989). Effect of psychosocial treatment on survival of patients with metastatic breast cancer. *Lancet 2,* 888–891.
Stone, A. A., Bovbjerg, D. H., Neale, J. M., Napoli, A., Valdimarsdottir, H., Cox, D., et al. (1992). Development of common cold symptoms following experimental rhinovirus infection is related to prior stressful life events. *Behavioral Medicine, 18,* 115–120.
Straus, S. E. (2001). *Placebo initiatives.* Retrieved December 5, 2001, from the National Center for Complementary and Alternative Medicine, National Institutes of Health Web site, http://www.nccam.nih.gov/fi/concepts/rfa/at-02-001.htm
Takkouche, B., Regueira, C., & Gestal-Otero, J. J. (2001). A cohort study of stress and the common cold. *Epidemiology, 12,* 345–349.
Thorn, B., & Saab, P. (2001). Notes from the APA Council of Representatives (CoR) meeting. *Health Psychologist, 23*(3), 5, 8.
Trautmann, A., & Vivier, E. (2001, June 1). Agrin: A bridge between the nervous and immune systems. *Science, 292,* 1667–1668.
Uchino, B. N., Uno, D., & Holt-Lunstad, J. (1999). Social support, physiological processes, and health. *Current Directions in Psychological Science, 8*(5), 145–148.
Vaillant, G. E., & Mukamal, K. (2001). Successful aging. *American Journal of Psychiatry, 158,* 839–847.
Vitaliano, P. P., Scanlan, J. M., Zhang, J., Savage, M. V., Brummett, B., Barefoot, J., & Siegler, I. C. (2001). Are the salutogenic effects of social supports modified by income? A test of an "added value hypothesis." *Health Psychology, 20,* 155–165.
Watson, M., Haviland, J. S., Greer, S., Davidson, J., & Bliss, J. M. (1999). Influence of psychological response on survival in breast cancer: A population-based cohort study. *Lancet, 354,* 1331–1336.
Wesley, R. C., Jr. (2003). *The unstated laws of clinical medicine.* Retrieved December 10, 2003, from http://www.drwesley.com/nlc/philos.htm
Winkelstein, J. A., & Childs, B. (2001). Why do some individuals have more infections than others? *JAMA, 285,* 1348–1349.