Emotional States and Physical Health

Peter Salovey — *Yale University*
Alexander J. Rothman — *University of Minnesota, Twin Cities Campus*
Jerusha B. Detweiler and Wayne T. Steward — *Yale University*

Positive emotional states may promote healthy perceptions, beliefs, and physical well-being itself. To explore potential mechanisms linking pleasant feelings and good health, the authors consider several lines of research, including (a) direct effects of positive affect on physiology, especially the immune system, (b) the information value of emotional experiences, (c) the psychological resources engendered by positive feeling states, (d) the ways in which mood can motivate health-relevant behaviors, and (e) the elicitation of social support. As anticipated by the Greek physician Hippocrates, positive emotions and healthy outcomes may be linked through multiple pathways.

That the arousal of emotion might have consequences for physical health is not a new idea. Hippocrates, the father of clinical medicine, posited four bodily fluids (humors) that when out of balance led to various physical maladies. The humoral imbalances thought to cause illness, also, in his view, produced characteristic and chronic emotional states—black bile led to sorrow, phlegm to sleepiness, blood to sanguine feelings, and yellow bile to anger. Thus, Hippocrates linked emotion and disease by virtue of their common antecedents. Although Hippocrates no doubt had the details wrong, he provided prescient guidance regarding possible connections between emotion and health.

Psychotherapists and practicing physicians similarly have recognized the comorbidity of psychological and physical disorders. Rates of mood and anxiety disorders are considerably higher among medical inpatients compared with the general population (Katon & Sullivan, 1990). Depressed individuals report somatic ailments in greater numbers than do nondepressed individuals (Katon, 1984) and appraise their health status less positively (Maddox, 1962; Tessler & Mechanic, 1978). When health plans offer psychological services through which individuals presumably can have their psychological distresses attended to, use of medical services for relief of physical symptoms is reduced (Cummings & Follette, 1976; Follette & Cummings, 1967; Jones & Vischi, 1979).

Although the comorbidity of depressed mood and increased reports of physical complaints is well documented, our understanding of the specific mechanisms that link emotional states and physical health is less certain. The premise that the onset of a physical illness that interferes with pleasurable daily activities or causes considerable pain could result in depressed mood is noncontroversial (Keefe, Wilkins, Cook, Crisson, & Muhlbaier, 1986; Rodin & Voshart, 1986; Turk, Rudy, & Stieg, 1987). Somewhat more controversial is the premise that both on-going and acute emotional experiences can produce changes in physical health (Cohen & Rodriguez, 1995; Herbert & Cohen, 1993). This article examines the influence of emotional states on physical health and considers a range of physiological, cognitive, social, and behavioral factors that may serve to link emotional experience and health. First, we examine the direct effects of positive and negative emotional experiences on physiology, especially of the immune system, and their implications for health outcomes. Next, we turn to the informational value of emotional experiences and examine its influence on people's perceptions of and decisions regarding their physical health. Third, we describe the evidence that positive emotional experiences provide people with psychological resources that enable them more effectively to prevent or deal with health problems. Fourth, we explore whether people use healthy and unhealthy behaviors as mood regulatory strategies. Finally, we consider the role of emotion in the complex relation between social support and health.

In keeping with the theme of this special issue of the *American Psychologist,* we place special emphasis on positive feelings and good health. However, because the research literature has so often focused on the opposite, we review how negative emotions might be associated with sickness too, especially when this work provides clues about how emotional resilience might have more salubrious consequences.

Direct Effect of Emotional States on Immunity and Illness

The physiological consequences associated with emotional experiences provide one mechanism by which emotional states may influence physical health. Although health psy-

Peter Salovey, Jerusha B. Detweiler, and Wayne T. Steward, Department of Psychology, Yale University; Alexander J. Rothman, Department of Psychology, University of Minnesota, Twin Cities Campus.

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Correspondence concerning this article should be addressed to Peter Salovey, Department of Psychology, Yale University, P.O. Box 208205, New Haven, CT 06520-8205. Electronic mail may be sent to peter.salovey@yale.edu.

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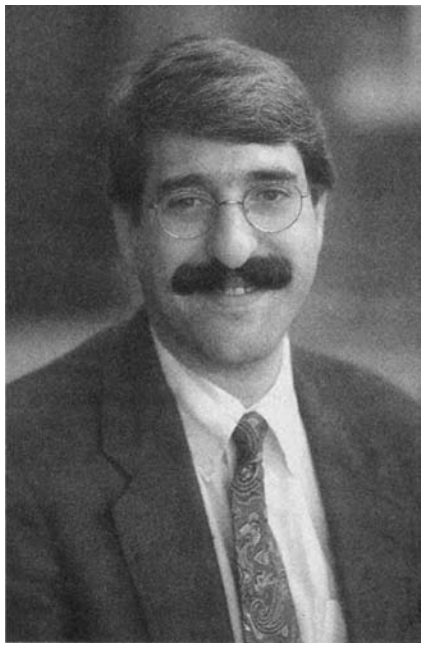

Peter Salovey
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chologists have often proposed that negative emotional experiences cause one to be more vulnerable to illness (e.g., Friedman & Booth-Kewley, 1987), it has been only in the past 15 years or so that investigators have been able to test these predictions directly. In general, negative emotional states are thought to be associated with unhealthy patterns of physiological functioning, whereas positive emotional states are thought to be associated with healthier patterns of responding in both cardiovascular activity and the immune system, although the data concerning negative states are more plentiful (e.g., Booth-Kewley & Friedman, 1987; Herbert & Cohen, 1993). We will focus primarily on the immune system here, as the cardiovascular consequences of emotional arousal (especially anger) have been discussed extensively elsewhere (e.g., Friedman, 1992; Kamarck & Jennings, 1991; Smith, 1992).

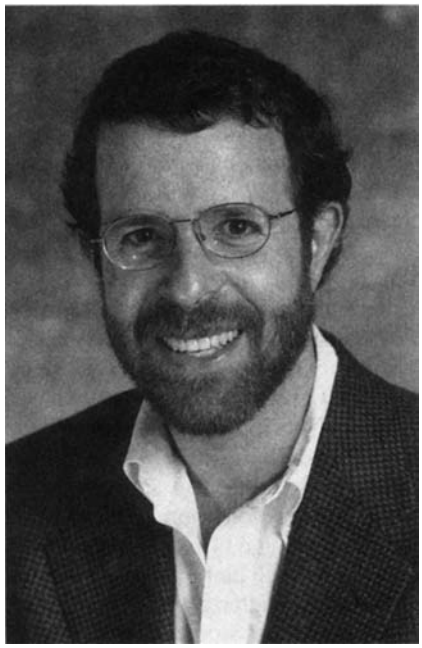
Reported positive and negative affect has been shown to be associated with the release of secretory immunoglobulin A (S-IgA), the antibody considered the first line of defense against the common cold, so that positive moods would appear to enhance immune system responding, but it is compromised by negative moods (Stone, Cox, Valdimarsdottir, Jandorf, & Neale, 1987; Stone et al., 1994; Stone, Reed, & Neale, 1987). Moreover, the increased frequency of desirable (but not undesirable) events predicts higher levels of immune response on subsequent days, even after controlling for the frequency of desirable events on the same day as the immune response was assessed (Stone et al., 1994). Several studies have also revealed a lagged relation between the low frequency of desirable events and the onset of respiratory illness (Evans & Edgerton, 1991; Stone, Reed, & Neale, 1987). In their most recent experiments, Stone and his collaborators have found that undesirable events lower S-IgA levels by increasing negative mood, but desirable events increase S-IgA levels by decreasing negative mood rather than by affecting positive mood (Stone, Marco, Cruise, Cox, & Neale, 1996). Green and Salovey, however, have argued that one should not expect differentiation of positive and negative moods as mediators when both mood measures are included in the same statistical model, because the two are negatively correlated, once nonrandom error is taken into account (Green, Goldman, & Salovey, 1993; Green, Salovey, & Truax, 1999).

Cohen and his colleagues have provided strong evidence that negative mood states increase people's susceptibility to illness (Cohen et al., 1995). In a laboratory paradigm in which people are exposed systematically to a respiratory virus, individuals who experienced greater negative mood at the time of the investigation developed a more severe illness in response to the virus than those whose moods were more positive (Cohen et al., 1995). The current challenge is to demonstrate that these links between negative mood and illness are mediated by changes in immune parameters.

Laboratory studies that manipulate people's moods experimentally provide some converging evidence regarding the causal influence of affective states on immune system functioning. Labott and her colleagues asked healthy college women to view two videotapes, one that was funny and one that was sad (Labott, Ahleman, Wolever, & Martin, 1990). S-IgA level increased after watching the humorous video, suggesting enhanced immune system activity; but it dropped after viewing the sad video, indicating suppressed immune system activity. These differences, however, were obtained only if participants had been instructed to express their mood overtly (we will return to this point shortly). Dillon, Minchoff, and Baker (1985–1986) have similarly demonstrated, among both men and women, that viewing a humorous video resulted in greater S-IgA compared with that obtained after viewing a neutral video.

However, several investigators have found that induced pleasant and unpleasant mood states have similar effects on immune functioning. Knapp et al. (1992) found that induced pleasant and unpleasant affective states were each associated with decreased lymphocyte proliferation to two common mitogens. When a group of actors was asked to experience pleasant and unpleasant moods of varying levels of arousal on different days, all moods affected natural killer cell activity and the ratio of suppressor to cytotoxic T cells similarly, regardless of their valence or level of arousal (Futterman, Kemeny, Shapiro, & Fahey, 1994). However, the proliferative response to the mitogen phytohemagglutinin was sensitive to the valence of the induced mood; it increased after positive moods and decreased after negative moods (but see Futterman, Kemeny, Shapiro, Polonsky, & Fahey, 1992).

We should note that some of the tests of the effects of emotional experiences on immune system function are methodologically compromised. One of the important tenets of psychoneuroimmunology is that immuno-suppression or immuno-enhancement should be assessed through



Alexander J. Rothman
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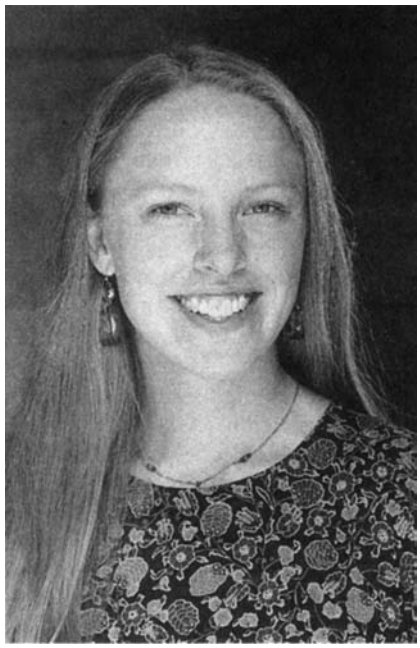
multiple assays because the various measures of immune system functioning are not always closely related to each other (Taylor, 1999). However, the studies cited above in which positive affect appears to be associated with better immune functioning usually are based on a single measure, secretory IgA. Furthermore, the Labott et al. (1990) and Dillon et al. (1985–1986) experiments relied on methods of data collecting (timed salivary flow) and laboratory antibody analysis (radial diffusion) now considered flawed. The work by Stone and his colleagues (1994, 1996) generally is based on better methods (e.g., saliva collected directly from the parotid allowing for better control over salivary flow).

Although the expression of emotions can have immediate effects on some aspects of the immune system, it is not clear how long such effects last and whether differences in chronic mood actually lead to clinically significant differences in disease resistance. There is some evidence that the chronic use of coping styles that promote either positive or negative moods is associated with a range of health outcomes. For example, baseline levels of S-IgA are positively correlated with the reported frequency with which people use humor as a coping mechanism (Dillon et al., 1985–1986). Similarly, the more older women cry as a coping mechanism, the greater the number of health problems they report (Labott & Martin, 1990). The immunological consequences associated with negative mood states may also serve to explain the finding that people who are dealing with severe stressors for longer than a month are substantially more susceptible to experimentally induced colds (Cohen et al., 1998). The observed relation between physical health and dispositional styles such as optimism (Peterson, Vaillant, & Seligman, 1988; Scheier & Carver, 1992; Scheier et al., 1989), hostility (Miller, Smith, Turner, Guijarro, & Hallet, 1996), and hardiness (Kobasa, 1979; Kobasa, Maddi, & Kahn, 1982) may be due in part to the chronic mood states engendered by the personality style and their resultant impact on physiological functioning (e.g., Segerstrom, Solomon, Kemeny, & Fahey, 1998; Segerstrom, Taylor, Kemeny, & Fahey, 1998).

Given that negative emotional states are associated with lowered immune activity and increased susceptibility to disease, one might conclude that people would benefit from minimizing or suppressing any negative feelings they might have. In fact, women who were instructed to suppress their emotional reactions to a sad film evidenced minimal change in their S-IgA levels (Labott et al., 1990). Although there may be some immediate immunological benefits to be obtained from suppressing one's negative feelings, the suppression or inhibition of negative emotional states can result in adverse physiological and health outcomes that may outweigh any short-term gains (Gross, 1998). Actively suppressing one's negative (or positive) emotional experience heightens the sympathetic activation of the cardiovascular system (Gross & Levenson, 1997). Emotional suppression has been hypothesized to be related to the development of coronary heart disease (Pennebaker, 1992) as well as the progression of cancer (Gross, 1989; Jensen, 1987; Temoshok, 1987), although such relationships have been difficult to demonstrate empirically (e.g., Joffres, Reed, & Nomura, 1985; Keene, 1980; Suls, Wan, & Costa, 1995).

In addition to the potential adverse health consequences associated with emotional inhibition, Pennebaker and his colleagues (reviewed in Pennebaker, 1989; Pennebaker & Traue, 1993) have demonstrated that interventions that help people process and confront traumatic life events produce significant improvements in health functioning, including fewer self-reported health problems (e.g., Greenberg & Stone, 1992; Greenberg, Wortman, & Stone, 1996; Pennebaker, Barger, & Tiebout, 1989), lower use of health services (e.g., Pennebaker & Beall, 1986; Pennebaker, Kiecolt-Glaser, & Glaser, 1988), and enhanced immune system activity (e.g., Esterling, Kiecolt-Glaser, Bodnar, & Glaser, 1994; Pennebaker et al., 1988; Petrie, Booth, Pennebaker, Davison, & Thomas, 1995). These benefits have been obtained despite the fact that people experience considerable negative affect during the time they are writing or talking about the trauma. In fact, Kelley, Lumley, and Leisen (1997) found that patients with rheumatoid arthritis who talked about the stressful events in their lives not only reported better physical functioning three months after disclosure, but the magnitude of improvement was positively related to the degree to which the disclosure process had induced a negative mood.

However, the paradigm developed by Pennebaker and others does not merely involve the expression or release of pent-up negative emotions. The effectiveness of the writing or verbalization task is believed to be based on its ability to help people work through the traumatic event. Although data regarding specific mediational mechanisms are limited, there is some evidence that people report greater health changes if during the writing task they used more



Jerusha B. Detweiler
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positive emotion words and over time engaged in more causal and insightful thinking (Pennebaker & Francis, 1996; Pennebaker, Mayne, & Francis, 1997). To the extent that disclosure helps people to repair their traumatic experiences, it may share important features with the mood regulatory strategies that people use on an on-going basis (Gross, 1998; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). People who report that they are generally able to regain and maintain positive emotional states are less likely to get sick or to use medical services when faced with a stressful life experience (Goldman, Kraemer, & Salovey, 1996; see also Catanzaro & Greenwood, 1994). There would appear to be direct, physiological benefits derived from experiencing and expressing positive emotional states. However, the health consequences of negative emotional states depend upon people's ability to work through and manage them. To the extent that people—because of dispositional or situational constraints—are unable to repair their negative moods, the persistent expression of negative affect may have adverse health consequences.

Informational Value of Emotional States

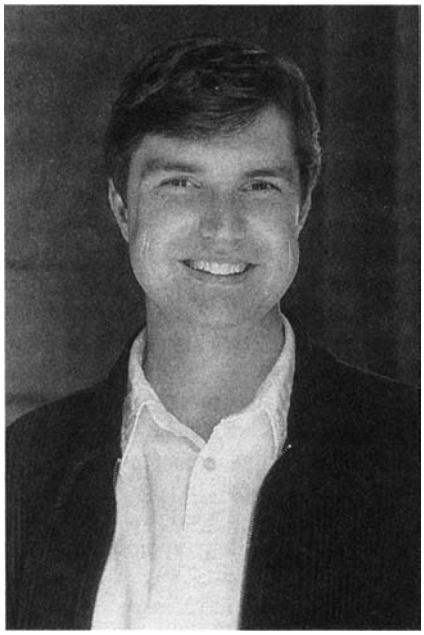
People's behavioral practices are a primary determinant of their physical health, and change in human behavior is likely the most efficient way to reduce disease morbidity and premature mortality (U.S. Department of Health and Human Services, 1991). A premise of nearly all theories of health behavior (e.g., Becker et al., 1977; Janz & Becker, 1984) is that people decide to adopt or maintain a particular pattern of behavior based on an analysis of the relevant costs and benefits associated with each behavioral option (for a review see Salovey, Rothman, & Rodin, 1998). Given that people rely on their emotional states as a source of information about how they are doing and that their emotions can alter the ease with which information comes to mind (Schwarz & Clore, 1996), people's assessment of their health status as well as different patterns of behavior may vary depending on their moods. Because these beliefs guide behavioral decisions, the influence of emotion on judgment offers a path by which emotional experiences can affect physical health.

Does a person's mood influence the recognition or interpretation of physical symptoms? Are people more likely to interpret a physiological response as a health concern if they are in a negative mood? To answer this question, people's mood states have been manipulated systematically in the laboratory and the effects on symptom reports examined. Across studies, people made to feel sad report more physical symptoms than those made to feel happy (Croyle & Uretsky, 1987; Salovey & Birnbaum, 1989), and those placed in a sad mood also attribute greater discomfort to their symptoms (Salovey & Birnbaum, 1989).

Studies that have examined whether naturally occurring variations in mood lead to symptom reporting provide a more complex set of results. Some investigators have found that the chronic tendency to experience a particular mood state (e.g., negative affectivity; Watson & Pennebaker, 1989) but not situational variations in mood predicts symptom reporting independent of illness severity (e.g., Cohen et al., 1995; Watson, 2000). However, others have found measures of state negative affect to be better predictors of symptom reports than measures of trait affect (e.g., E. A. Leventhal, Hansell, Diefenbach, Leventhal, & Glass, 1996). Some investigators even observe that symptom reporting is independent of prior reports of negative affect (Diefenbach, Leventhal, Leventhal, & Patrick-Miller, 1996). Significant differences in the methodology and measures used across these studies render any interpretation of the conflicting pattern of results difficult. However, the consistent effect of induced mood on symptom reporting does suggest that there are conditions under which mood can systematically alter symptom reports.

The presence of physical symptoms is but one factor motivating individuals to attend to their health or to seek treatment. Perceptions of personal vulnerability are an important antecedent to the adoption of appropriate behavioral practices (Weinstein, 1993). Mood can influence people's perceptions of risk for an unwanted health problem, so that people in a happy mood believe themselves to be less vulnerable than do those in a sad mood (e.g., Johnson & Tversky, 1983; Mayer, Gaschke, Braverman, & Evans, 1992; Mayer & Volanth, 1985; Salovey & Birnbaum, 1989). Treatment decisions are also affected by people's beliefs about their capacity to engage successfully in salubrious behaviors (i.e., self-efficacy) and their expectations that such behaviors will alleviate illness or maintain health (i.e., response efficacy; Bandura, 1977, 1997; for a review see Salovey et al., 1998).

Salovey and Birnbaum (1989) demonstrated that mood states can influence people's beliefs regarding their ability to carry out health-promoting behaviors. As com-



Wayne T. Steward
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pared with sad individuals, those who were happy perceived themselves as better able to engage in health-promoting behaviors and had greater confidence that these behaviors would relieve their illness. Individuals who are ill and are experiencing sad moods may thus be caught in a bind. On the one hand, they appear to experience their symptoms as more frequent, intense, and discomforting. On the other hand, they believe that there is little they can actually do to make themselves feel better. Such malaise may make the sad individual especially unlikely to adhere to treatment recommendations.

Like Darwin (1872), many scholars have recognized that emotional states offer people information about their environments. Positive emotional states signal that one's environment is safe, whereas negative emotional states indicate that there are aspects of one's environment that must be addressed and corrected (Schwarz & Clore, 1996). The informational value of emotional states may have implications for the decision to seek care for a health problem. Delays in care seeking are a function of a number of psychological factors that guide how people interpret and evaluate physical symptoms (Andersen, Cacioppo, & Roberts, 1996; Dracup et al., 1995; Safer, Tharps, Jackson, & Leventhal, 1979). However, the relation between emotional states and care seeking has focused primarily on the impact of stressful life events (e.g., Cameron, Leventhal, & Leventhal, 1993, 1995).

To the extent that positive emotional states are taken to indicate the absence of problems that need to be addressed, when people are feeling happy they may be less likely to recognize signs of physical distress and consequently may be less likely to seek medical care. On the other hand, negative emotional states may engender greater vigilance or concern among people who are experiencing physical distress, which may in turn facilitate contact with a medical professional. However, investigators have yet to test directly the effect of pleasant and unpleasant moods on care seeking. The observation that people in pleasant emotional states typically rely on less effortful, heuristic-based cognitive processing strategies (Chaiken, Wood, & Eagly, 1996; Schwarz, Bless, & Bohner, 1991) and are motivated to act in ways that enable them to sustain that emotion state (Wegener & Petty, 1994; Wegener, Petty, & Smith, 1995) provides a framework that is consistent with the predicted effect of positive mood on care-seeking. Yet, there appear to be situations in which feeling positive about either oneself or one's future provides people with the psychic resources enabling them to process more thoroughly threatening information (Aspinwall, 1998; Aspinwall & Brunhart, 1996; Reed & Aspinwall, 1998; Trope & Pomerantz, 1998). Whether the greater willingness to consider information about a potential health concern translates into a similar willingness to recognize a sign of current physical distress is an empirical question that needs to be addressed.

Of course, the benefits associated with faster decisions to seek care are contingent on the accuracy with which people distinguish between symptoms that are and are not disease related. It is possible that negative emotional experiences may heighten feelings of concern to such an extent that people become significantly more likely to seek help in situations in which medical care is, in fact, not needed (Stretton & Salovey, 1998).

Negative emotional experiences may not always facilitate care-seeking. When ambiguous physical symptoms and stressful life events co-occur, the symptoms may be considered part of one's emotional reaction to the life stressor and are less likely to prompt a decision to seek medical attention (Cameron et al., 1995). Any difficulty people have identifying the source of their physical distress may be exacerbated by the fact that negative emotional states shift people's attention toward themselves and away from their external environment. Evidence that sadness increases attentional focus on to the self has been obtained in both correlational studies (reviewed by Ingram, 1990; Pyszczynski & Greenberg, 1987; Salovey & Rodin, 1985) and experiments (Salovey, 1992; Sedikides, 1992; Wood, Saltzberg, & Goldsamt, 1990). Because focusing attention on the body increases perceptions of symptoms and sensations (Pennebaker, 1982; Pennebaker & Lightner, 1980), people may become highly sensitive to the contingent relation between negative emotional events and physical symptoms and consequently develop explanatory theories that serve to integrate these psychological events. In line with H. Leventhal's common-sense model of illness (H. Leventhal, Nerenz, & Steele, 1984), the specific content of the theories people develop should determine whether physical symptoms are likely to be (mis)attributed to stressful life events.

Emotional States and Psychological Resilience

Appropriate health practices are often difficult to carry out and psychologically taxing. In order to adopt precautions,

people must first recognize the possibility that they are at risk for an unwanted health problem. Yet, people actively strive to maintain their optimistic sense of their personal risk (e.g., Weinstein & Klein, 1995) and resist acknowledging that they have health concerns (e.g., Ditto & Lopez, 1992). People who use illness screening or detection practices must be willing to run the risk of learning that they have a health problem. Noncompliance with screening guidelines often reflects an unwillingness to face this risk (Rothman & Salovey, 1997). Positive emotional states can facilitate healthy behavioral practices by providing the resilience that people may need to confront the possibility that they might have or develop a serious health problem. In line with this perspective, Fredrickson (1998) has argued that the primary function of positive emotional experience is that it facilitates the availability of personal resources that afford innovation and creativity in thought and action (see also Isen, 1987). Positive emotional states may offer people the opportunity to consider and plan for future outcomes, whereas negative emotional states orient people to respond to proximal, immediate events (Frijda, 1986).

Although there are no data that directly confirm the predicted link between positive emotional experiences and the increased availability of psychological resources, there are empirical findings that are consistent with this perspective. For example, humor has been shown to help people cope more effectively with life stressors. Expression of humor appears to moderate associations between negative life events and mood disorders (Martin & Lefcourt, 1983; Nezu, Nezu, & Blisset, 1988) and increases people's tolerance for higher levels of physical discomfort (e.g., Cogan, Cogan, Waltz, & McCue, 1987). Also, positive experiences engendered, for example, by recalling one's past acts of kindness, allow individuals to accept health-risk information less defensively, even when it is quite self-relevant (M. B. Reed & Aspinwall, 1998; see also Trope & Pomerantz, 1998).

The health benefits associated with both domain-specific optimism (e.g., Taylor et al., 1992; see also Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000, this issue) and dispositional optimism (e.g., Peterson, 1988; Scheier & Carver, 1985, 1992; see also Peterson, 2000, this issue) may reflect, in part, the psychological resources afforded by the belief that one will experience good instead of bad outcomes. Optimists who are coping with a health problem or are undergoing a medical procedure may be better able to focus on and plan for future outcomes. For example, Scheier et al. (1989) reported that in a sample of men who underwent coronary artery bypass surgery, those who were dispositionally optimistic were more likely to cope by focusing on postoperative goals. Five years after surgery, optimists reported healthier habits, such as regular use of vitamins, eating lunches with less fatty foods, and enrollment in a cardiac rehabilitation program (study by Scheier, Matthews, Owens, Magovern, & Carver as cited in Scheier & Carver, 1992).

A positive state of mind may enable people to consider personally unfavorable information. People who hold optimistic beliefs about their health spend more time reading information about health risks than about more favorable health concerns and, subsequently, have better memory for that information (Aspinwall & Brunhart, 1996). Moreover, the relation between optimism and information-seeking is even stronger when the information is personally relevant and, thus, presumably more threatening. The tendency to be hopeful when considering future life events may also enable people to become more informed about potential health outcomes (Snyder, 1994; Snyder, Irving, & Anderson, 1991). For example, in an investigation of hope and college women's cancer-related health practices, hopeful women were better informed of the negative health effects of behaviors such as smoking (Irving, Snyder, & Crowson, 1998). Individuals high in hope also reported they would be more willing to visit health professionals and to perform detection behaviors (such as skin cancer exams and breast examinations; Irving et al., 1998). Consistent with the premise that positive emotional states facilitate healthy behavioral practices, positive affectivity mediated the relation between hope and intended cancer-related behaviors.

Although the tendency to experience positive emotions may be a function of stable individual differences in dispositions such as optimism or hope, it can also be manipulated by activities or interventions that elicit positive affect. People coping with a serious illness spontaneously engage in downward social comparison (i.e., compare themselves to someone who is worse off than they are; e.g., Wood, 1989; Wood, Taylor, & Lichtman, 1985). Because downward social comparison generally engenders feelings of positive affect (Taylor & Lobel, 1989), it may be that people engage in this pattern of comparisons to regulate their mood, and the positive affect associated with downward social comparison provides them with the psychological resources they need to cope effectively with their health problems. This analysis suggests that downward social comparison may not only provide short-term benefits (i.e., mood regulation) but also indirectly facilitate long-term coping.

Before closing our discussion on the relationship between positive affect, psychological resources, and health, we would like to highlight the health-care worker's role as one who can inspire hope in others. Freud (1953) described that patients' expectancies, "colored by hope and faith," are "an effective force . . . in all our attempts at treatment and cure" (p. 289). The link between such hopeful expectations and health outcomes becomes both clear and convincing through the investigation of the placebo, a pharmacologically inert substance given to patients in place of an active medication. Approximately 35% of patients report symptom relief in response to a placebo (estimate based on a review of the literature by Hafen, Karren, Frandsen, & Smith, 1996). Frank (1974) concluded that by raising the patient's level of hope, the health care professional's positive expectations (even when administering a placebo therapy) can have a concrete impact on the health of the patient. The positive mood experience that comes from a renewal of hope, particularly among those who are strug-

gling with illness, reaps health benefits that cannot be underemphasized.

Changes in Mood and Health-Relevant Behaviors

Individuals may use behaviors relevant to their health as mood regulation strategies. For example, people might choose to eat, use tobacco, or exercise in response to an upsetting event. There is considerable evidence, for example, that people use and abuse alcohol because of their expectations about how it will influence their emotional state (Cooper, Frone, Russell, & Mudar, 1995; Gustafson, 1991; Wills & Shiffman, 1985). Cooper et al. (1995) have argued that people consume alcohol to satisfy two distinct functions that are closely tied to their emotional states: People drink because they believe it will help them to escape or regulate negative feelings, or they drink because they believe it will heighten or stimulate positive feelings (see Sayette, 1993; Stritzke, Lang, & Patrick, 1996).

Negative emotional experiences are an important antecedent to tobacco use (Brandon, 1994). Rates of smoking are considerably higher among people who have been diagnosed as clinically depressed (e.g., Glassman et al., 1990). Studies that have manipulated people's affective experiences experimentally have provided evidence that is consistent with the epidemiological data; compared with people in either a control or a positive mood condition, people placed in a negative mood report greater cravings for cigarettes and subsequently smoke more (e.g., Brandon, Wetter, & Baker, 1996; Payne, Schare, Levis, & Colletti, 1991). Finally, people report that the desire to repair or to improve their mood is a primary reason that they smoke, and the situations most likely to trigger a relapse during a quit attempt are those that involve an unpleasant emotional experience (e.g., Brandon, Tiffany, Obremski, & Baker, 1990; Shiffman, 1982).

Although people are attracted to many health-relevant behaviors because of a desire to avoid or blunt a negative emotional experience, some behaviors are attractive because of their ability actually to induce positive feelings. Kelly and Kalichman (1998) have reported that the pleasure associated with unprotected sex predicted the continued practice of unprotected anal intercourse, even after controlling for people's attitudes and intentions regarding safer sex. Another form of physical activity, exercise, increases positive feelings and reduces negative feelings (e.g., Byrne & Byrne, 1993; Steptoe & Cox, 1988), although people's affective state before exercise may attenuate the actual change in emotional experience (e.g., Gauvin, Rejeski, & Norris, 1996; Rejeski, Gauvin, Hobson, & Norris, 1995). The emotional benefits obtained from regular exercise may be of such value that interference with habitual patterns of exercise behavior can precipitate mood disturbances (e.g., Mondin et al., 1996).

People's behavior may be motivated by the desire to improve their mood, but the processes by which the behavior alters mood is unclear. Specifically, research is needed to tease apart the relative influences of physiological changes associated with the behavior and cognitive expectancies regarding the influence of the behavior on emotional experience. In addition, investigators may need to attend to a broader array of emotional states when assessing the degree to which a behavior successfully made people feel better. For example, a diary study of self-defined chocolate addicts and nonaddicts found that the so-called addicts tended to eat more chocolate when they were in depressed moods (Macdiarmid & Hetherington, 1995). However, bad moods were not ameliorated by eating chocolate; the chocolate addicts experienced increased levels of guilt. Feelings of guilt or shame may reflect regret over having relied on unhealthy behavioral practices to repair a mood state.

If behaviors such as eating or drinking do not actually improve mood, why are they motivated by upsetting situations? Baumeister (1991) argued that a number of behaviors, including drinking and binge eating, provide a person with an opportunity to escape from one's self. While engaging in the behavior, people's attention is directed upon the act itself with little attention allocated to the problems that motivated the action or its consequences. In line with this perspective, Baumeister presented evidence suggesting that during an escape from the self, a person also experiences a blunting of emotion, including any unpleasant emotions that elicited the need for escape (see also Leith & Baumeister, 1996).

Mood and the Elicitation of Social Support

The impact of interpersonal relationships on people's emotional states and the recursive effect that these states have on the availability of interpersonal contact offers a final path through which emotional states can affect health. The influence of social support on health is well-established (Cohen & Syme, 1985; Stroebe & Stroebe, 1996). Social support is related to lower mortality (Berkman, 1985), greater resistance to communicable diseases (Cohen, 1988), lower prevalence and incidence of coronary heart disease (Seeman & Syme, 1987), and faster recovery from heart disease and heart surgery (Ruberman, Weinblatt, Goldberg, & Chaudhary, 1984). In general, individuals who have minimal psychosocial resources appear to be more prone to illness and mood disturbances when faced with increased stress levels than individuals with considerable social support (DeLongis, Folkman, & Lazarus, 1988).

There are two ways in which social support can affect health (Cohen & Syme, 1985; Cohen & Wills, 1985; Stroebe & Stroebe, 1996). The buffering hypothesis argues that people benefit from social support only when they experience a stressful life event, whereas the direct effect hypothesis argues that social relationships promote health and well-being regardless of the individual's stress level. Both buffering and direct effects are possible, depending on the nature of the stressor. In either case, the relation between social support and health may be mediated, in part, by changes in people's emotional experience. Social support may thus lead the individual to experience a lesser degree of stress in the face of a challenging situation.

Social relationships may also allow individuals to feel secure with the knowledge that help will be provided when and if necessary. This feeling of security may increase their resilience to physical illness (Cohen & Syme, 1985). Finally, social support may keep people from feeling lonely, a condition that is associated with somatic complaints, depression, and general feelings of distress (Peplau, 1985). Medical students who described themselves as lonely have lower natural killer cell activity than less lonely students, and respond with a weaker immune response to a hepatitis B vaccine than those with a larger social support network (Glaser et al., 1992; Kiecolt-Glaser & Glaser, 1992).

There is likely to be a reciprocal relation between emotional experience and social support: Not only does the provision of social support influence one's emotional state, but a person's emotional state also influences the likelihood that social support is provided. We would expect that people would be more likely to provide on-going assistance to others who maintain a more positive outlook on life. Several cross-sectional studies have observed a positive relation between mood and the perceived number of friends and family members who could be counted on and the actual number of people who had provided help over the course of a year (Eckenrode, Kruger, Cerkovnik, 1986, cited in Cohen, 1988; see also Cohen et al., 1982). Signs of emotional distress signal one's need to potential providers of social support. However, the prolonged expression of negative emotion deters people from helping out (Pennebaker, 1993; Stroebe & Stroebe, 1996).

Although direct empirical support for the claim that positive mood mediates the relation between social support and health is not available, we are confident that positive mood is a critical component of social interactions. We agree with Cohen and Syme's (1985) suggestion that social support, through the stability, predictability, and control that it provides, leads people to feel positively about themselves and their environment. These feelings, in turn, motivate people to want to take care of themselves, interact more positively with others, and demonstrate resilience in times of stress. The combination of these factors facilitates continued physical and psychological health and further strengthens the individual's social network. Individuals who are happy find it easier to develop a rich network of social support as compared with those who are more dour. We are likely attracted to people who are pleasant, thus providing them with the health benefits of social support.

Conclusion

In this special issue of the *American Psychologist,* we celebrate the accomplishments of the field of psychology as we enter the year 2000 by focusing on positive aspects of human behavior. As we recognize the value of focusing on optimal experiences and the good life more generally, we still need to recognize that our understanding of how positive mental states affect physical health has been informed not only by studying the positive, but by focusing on the negative as well. For instance, Harvard's famed physiologist, Walter Cannon (1957), spent several decades documenting what he called *voodoo death,* stories in various cultures about people who because of some major troubling emotional experience (often extreme fright) suddenly died. Cannon even traced a reasonable pathophysiology that still sensibly provides an explanation for how a person literally could be scared to death. Such findings help to illuminate mechanisms connecting all emotions, pleasant and unpleasant, to various physical health endpoints from well-being to mortality.

There has been long recognition that an optimistic mind and exhilarated spirit accompany a healthy body. King Solomon suggested that "a merry heart doeth good like a medicine" (Proverbs 17:22), and every student of health psychology has heard the story of how journalist Norman Cousins (1979) attributed his recovery from ankylosing spondylitis, a potentially life-threatening collagen disease, to his active use of laughter. Cousins believed that ten minutes of laughing provided him with two hours of pain-free sleep and that inflammation in the affected tissues was reduced after these laughing sessions. What is wonderful at this juncture is that theoretical and methodological advances in recent years have allowed us to move from these anecdotal accounts to rigorous testing of the effects of emotions on physiological functioning and health. In the coming century, the biopsychosocial mechanisms accounting for these remarkable correlations likely will be untangled, and these scientific breakthroughs could then serve to expand the basis for relevant clinical practice.

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