
Psychological Resources, Positive Illusions, and Health

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Psychological beliefs such as optimism, personal control, and a sense of meaning are known to be protective of mental health. Are they protective of physical health as well? The authors present a program of research that has tested the implications of cognitive adaptation theory and research on positive illusions for the relation of positive beliefs to disease progression among men infected with HIV. The investigations have revealed that even unrealistically optimistic beliefs about the future may be health protective. The ability to find meaning in the experience is also associated with a less rapid course of illness. Taken together, the research suggests that psychological beliefs such as meaning, control, and optimism act as resources, which may not only preserve mental health in the context of traumatic or life-threatening events but be protective of physical health as well.

Optimism, a sense of personal control, and the ability to find meaning in one's life experiences are valuable psychological resources long believed to be associated with mental health (Frankl, 1963; Seligman, 1998; Taylor, 1989). These psychosocial resources become especially important when people are faced with challenging or threatening events (Taylor, 1983). They may act as reserves, enabling people to cope more effectively with such events. In this article, we address a related question: Can the psychological resources of optimism, personal control, and meaning not only buffer people psychologically against adverse responses to illness but actually influence health in a beneficial direction?

Our work on this issue began with the formulation of cognitive adaptation theory (Taylor, 1983), which evolved from an interview study with breast cancer patients (e.g., Taylor, Lichtman, & Wood, 1984). We were originally guided by an effort to identify those resources that would help women return to their previous level of functioning after going through a traumatic and potentially life-threatening event. The emotional and poignant interviews revealed that rather than getting back to normal, most of the women reported that their lives had changed, in some ways for the better. Some noted that they had a new sense of themselves as being strong and resilient. Others talked about their ability to reestablish priorities and to make time for the activities that were most important to them. Most noted that certain social relationships, such as those with

their family and close friends, took on particular significance and became the activities to which they devoted most of their time and attention.

A surprising, somewhat startling finding of the research was that some of the positive beliefs these women developed about their breast cancer experience were illusory (Taylor, 1983). Many women expressed the belief that they could personally control the cancer and keep it from coming back. Others insisted they had been cured, although their records showed them to have progressing illness. Despite the fact that these beliefs were inconsistent with objective medical evidence, they were associated with the criteria normally associated with mental health and not with psychological distress (Taylor, 1983; Taylor et al., 1984). Moreover, there was no evidence that when these beliefs were disconfirmed by subsequent illness progression, the women were left worse off for their overly positive perceptions. Since that time, we have uncovered similar findings in studies with people infected by HIV or with AIDS (Reed, Kemeny, Taylor, Wang, & Visscher, 1994) and with heart disease (Helgeson & Taylor, 1993); other researchers have also observed that life-threatening events often confer surprising advantages (Leedham, Meyerowitz, Muirhead, & Frist, 1995; Petrie, Buick, Weinman, & Booth, in press; Rose, Derry, & McLachlan, 1995; Shifren, 1996).

The disconcerting illusory component of these beliefs, however, remained a mystery. There was little precedent in the mental health literature for understanding this finding, inasmuch as most theories of mental health consider contact with reality to be a critical aspect of positive mental

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functioning (e.g., Jahoda, 1958). The social cognition literature, however, provided considerable evidence that normal human perception is marked by three mild and robust positive illusions, that is, beliefs that represent mild positive distortions of reality (Fiske & Taylor, 1991). Self-enhancement, unrealistic optimism, and an exaggerated perception of personal control often characterize normal thought (Taylor & Brown, 1988). Positive illusions appear to have protective psychological effects generally that may become especially important in the context of severely threatening events. Our more recent empirical efforts have focused on the implications that positive illusions may have for physical health, especially for course of disease.

Psychological Resources and Course of Disease

There are several reasons to believe that positive beliefs, such as those that form the core of positive illusions, might influence the course of physical disease. For example, positive beliefs may have an impact on emotional states, which may affect the physiology and neuroendocrine underpinnings of disease states. Although few studies have investigated the relation of positive mental states to disease course, a number of negative emotional states have been tied directly to physiological changes prognostic for illness and to the development of several chronic diseases (Cohen & Herbert, 1996; Frasure-Smith, Lesperance, & Talajic, 1995; Friedman & Booth-Kewley, 1987; Herbert & Cohen, 1993). Such psychological states as depression and anxiety, for example, have a variety of physiological concomitants and have been related to altered immune processes (Herbert & Cohen, 1993) and to the development and course of coronary heart disease (Booth-Kewley & Friedman, 1987; Frasure-Smith et al., 1995). In both cross-sectional and

longitudinal research, chronic dysphoric emotion has predicted vulnerability to a broad array of illnesses, as well as a risk of early mortality (Friedman & Booth-Kewley, 1987; Peterson, Seligman, & Vaillant, 1988). Although positive and negative affective states are not polar opposites, often being only modestly correlated in these investigations, there is independent evidence that positive emotional states are linked to positive physiological changes in both experimental studies (Futterman, Kemeny, Shapiro, & Fahey, 1994) and longitudinal studies (Stone, Cox, Valdimarsdottir, Jandorf, & Neale, 1987). Perhaps, then, positive beliefs are tied to physiological changes by positive affect. This pathway gains credence from a study by Segerstrom, Taylor, Kemeny, and Fahey (1998), who found that an association between optimism and higher numbers of CD4 (helper) T cells in stressed law school students was mediated partially by the positive mood associated with optimism.

Positive beliefs also may be connected to physical disease by promoting better health behaviors. People who have a positive sense of self-worth, belief in their own control, and optimism about the future may be more likely to practice conscientious health habits and to use services appropriately. Taylor, Kemeny, Aspinwall, Schneider, Rodriguez, and Herbert (1992), for example, found that men who were unrealistically optimistic about their ability to stave off the progression of the AIDS virus nonetheless practiced better health habits than did their more pessimistic counterparts.

A third basis for predicting a relationship between positive beliefs and course of illness is based on the fact that positive emotional states are believed to be associated with good social relationships (Taylor & Brown, 1988). Optimistic, self-confident people with a sense of personal control may have more social support or be more effective at mobilizing it during times of stress (Taylor & Brown, 1994; but see Colvin, Block, & Funder, 1995, for an alternative view).

Finally, major stressors such as illness often produce additional stressors, such as job loss, financial concerns, caregiving responsibilities for others, or loss of social support, that may, in turn, exacerbate the course of illness; such co-occurring stressors may be better managed by people with well-developed psychosocial resources. For example, optimism, a sense of personal control, and self-esteem have been tied to active coping efforts (Aspinwall & Taylor, 1997; Taylor et al., 1992), which enable people to guard against or offset stressful events before their full implications may be felt. Such abilities to cope actively and proactively with respect to health may minimize adverse physiological effects of stress.

HIV as a Disease Model for Studying the Effects of Psychosocial Resources on Health

Kemeny's research program in psychoneuroimmunology provided a venue for examining these important issues. Much of Kemeny's research has used HIV infection as a disease model for understanding psychosocial influences



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on disease course, a model that has been useful for examining these processes for several reasons. First, there are a large number of infected individuals who can be identified early in the disease process at the asymptomatic stage, so one can chart the course of disease from the symptom-free period forward. With many other diseases, such as cancer and heart disease, researchers are typically less able to identify participants at the asymptomatic stage and instead must wait until the disease is manifest.

Second, because the population with HIV is more youthful than is the case with many other chronic diseases, many of the difficulties inherent in examining psychosocial predictors of disease in older populations can be avoided. In particular, with HIV, problems of comorbidity are few, at least in the early stages of infection, and so the difficulty of unraveling the influence of one chronic problem on another often does not emerge until quite late in the disease process.

Third, there are known cofactors that can be reliably measured and controlled in statistical analyses to rule out potential confounding factors in the study of psychosocial influences on the course of disease. In the case of HIV infection, for example, controlling for age, alcohol consumption, drug use, sleep, and medication use, as well as other potential confounding variables, lends a precision to the analytic phase that cannot be obtained with diseases for which the cofactors remain largely elusive.

Fourth, being able to follow a disease over a long period of time, from the asymptomatic period through death, enables one to evaluate several established routes that may mediate between a psychosocial variable of interest as a predictor of disease course (Taylor, Repetti, & Seeman, 1997). As just noted, these include changes in affective states, such as depression or anxiety; changes in social support; differential practice of health habits or treat-

ment-seeking behaviors and their potential role in the onset or exacerbation of symptoms; and differential exposure to stressors, which may challenge the immune system and produce a more rapid course of illness.

Fifth, unlike many other chronic diseases, HIV infection has meaningful ordinal scales of disease progression. These include the number of CD4 T lymphocytes and viral load. The opportunity to look at these biological markers of disease progress is a significant advantage to health psychologists attempting to plot dose-response relationships or to study the psychosocial predictor-disease course relationship over different stages in the course of disease.

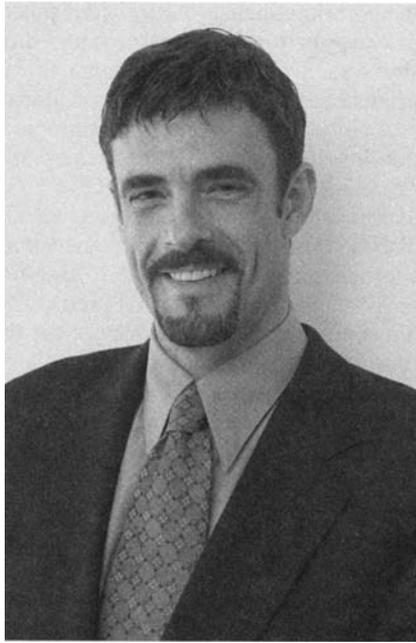
A sixth advantage of HIV as a disease model is that there are meaningful clinical markers identified with HIV infection: in particular, symptom appearance, the diagnosis of AIDS, and ultimately death itself. Seventh, to the extent that we understand the psychosocial factors that may be related to disease course, there is a potential to develop interventions based on such data. Keeping people healthy as long as possible is an important goal for AIDS researchers; by understanding the role of psychosocial factors in disease course, one may intervene with the hope of slowing disease progression (for an extended discussion of this issue, see Cole & Kemeny, 1997, in press; Kemeny, 1994).

Finally, HIV as a disease model has the capacity to silence, or at least subdue, critics of this line of work on several fronts. Immunologists, for example, are not necessarily impressed when a psychosocial factor is seen to produce changes in immunological parameters, such as natural killer cell activity or T cell cytotoxicity. A glass of wine or a brisk walk can produce similar immunological changes. However, when they can see an effect on disease course, they are more impressed. The reverse is often true of health psychologists, who are not particularly surprised to see a relationship between a psychosocial predictor and a health outcome, such as death, but are quite impressed by changes in immunological parameters that provide clues to the pathways by which such relationships may be understood.

HIV is now more limited in its usefulness as a disease model for such purposes because of recent developments in its management. The discovery of protease inhibitors and their widespread use by people infected with HIV leads at least to disjunctions in the course of illness and often to the elimination of the downward course of disease in people who adhere to treatment. The work reported in this article was developed in advance of these exciting developments and, as such, is unaffected by them.

Psychosocial Predictors and Course of Illness in Men With HIV Infection

An analysis of the course of disease among people infected with HIV is a valuable context for examining the benefits of psychosocial resources, such as positive illusions, because it provides an opportunity to examine criticisms of the theory's framework. Some have suggested that positive illusions may be beneficial as long as they remain unchallenged, but in circumstances when disconfirmation of overly optimistic beliefs is likely, those beliefs may lead to



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maladjustment, specifically, psychological distress and other adverse consequences. Advancing or terminal disease constitutes a severe challenge to the unrealistic optimism and exaggerated sense of personal control that might otherwise buffer an individual from the adverse consequences of advancing disease.

Moreover, alternative theories have maintained that such beliefs as positive illusions may not be adaptive at the final stages of life. Specifically, in her theory of adjustment to terminal illness, Kübler-Ross (1969) characterized acceptance as the final stage in adjustment to death, which often immediately precedes it. She suggested that the acceptance stage is characterized by a tired and peaceful although not necessarily pleasant psychological state and by resignation to the prospect of death. In 1987, she explicitly extended these ideas to people with AIDS, arguing that acceptance is psychologically adaptive, permitting people to come to terms with the inevitable, to make final preparations for their departure, and to use the time to say their good-byes to family and friends. Although there has been little empirical support for Kübler-Ross's position (Silver & Wortman, 1980), her work has had great influence on public thinking and especially on clinical practice, and so the merit of her position warrants attention.

The positive illusions framework makes quite different predictions, arguing that mildly but unrealistically positive beliefs may be more adaptive than realistic beliefs, even in the case of advancing disease. Moreover, such beliefs are quite common. In a study of adjustment to HIV, Taylor et al. (1992) found that HIV-seropositive gay men who were unrealistically optimistic about the future course of their infection were better adjusted and coped more actively with their situation than those who were less optimistic. Moreover, these unrealistically optimistic be-

liefs did not compromise their health behaviors or risk-related sexual behavior. The frequent but by no means ubiquitous evidence of these beliefs at the final stage of life provides an opportunity to compare and evaluate these quite different accounts of what may constitute psychological adjustment when facing the prospect of death. Moreover, as noted earlier, they provide an opportunity to extend and test the relevance of the positive illusions framework to physical health as well.

Realistic Expectations and the Course of AIDS

In a first study that tested these competing frameworks (Reed et al., 1994), we recruited 78 gay men who had been diagnosed with AIDS. These men were all participants in the Multicenter AIDS Cohort Study (MACS), a multisite collaborative longitudinal investigation of the natural history of HIV infection and AIDS. Because the data were collected in the late 1980s, the life expectancy for these men was not long, and consequently our sample was small. The men we recruited were mostly White, had an average age of 38 years, and were well-educated; at the time of the study, they had been diagnosed with AIDS for about one year. At the close of the study, two thirds of the men had died. As part of Kemeny et al.'s (1994) psychosocial sub-study with the MACS, these men completed an extensive questionnaire assessing their self-reported health status, psychological adjustment, psychological responses to HIV (items based on Folkman & Lazarus's, 1980, Ways of Coping measure), and a number of standardized scales, such as the Life Orientation Test (LOT; Scheier & Carver, 1985), a measure of dispositional optimism, the Index of Well-Being (Campbell, Converse, & Rodgers, 1976), the Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974), and the Rosenberg Self-Esteem Scale (Rosenberg, 1965).

Of particular interest were the results of a factor analysis of coping responses to "the effects of AIDS on your health and the life-threatening nature of the illness." One of the identified coping factors assessed realistic acceptance of one's own death. Specifically, the items on this factor, which we called Realistic Acceptance, were "I tried to accept what might happen," "I prepare myself for the worst," "I go over in my mind what I will say or do about this problem," and the reverse-coded item "I refuse to believe that this problem has happened." Those who score high on this factor are essentially acknowledging the likelihood of their risk for death, whereas those who score low on it are not engaged psychologically or behaviorally with the final stage of life. Comparing individuals who scored high on this factor with those who scored low on it enabled us to compare Kubler-Ross' predictions regarding adjustment to the prospect of death with our own. Participants were divided into high and low Realistic Acceptance on the basis of a median split, and a survival analysis was conducted.

Realistic acceptance of one's own death did indeed predict longevity. The men who scored high on Realistic Acceptance typically died nine months earlier than those



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who scored low. The analysis was repeated, controlling for a wide variety of potential predictors of death, including age, level of education, time since diagnosis, self-reported health status, number of AIDS-related symptoms, level of CD4 T helper cells, psychological distress, depression, fatigue, presence or absence of suicidal ideation, initial diagnosing condition, neuropsychological impairment, and the use of zidovudine (AZT), which, at the time, was the only treatment available to these men. The relation between Realistic Acceptance and length of survival remained significant when these variables were statistically controlled.

Through a second set of analyses we examined whether any of the known pathways relating psychosocial resources to disease course could account for the relationship between realistic acceptance and more rapid course of death. Specifically, a first plausible hypothesis is that people who are accepting of their own death may engage in poorer health behaviors that contribute to diminished survival time. However, analyses in which we controlled for health habits rendered this route implausible as a mediator. A second possibility is that people who are not accepting of their death have high levels of social support, which prolongs life. This hypothesis, too, was not supported. A third possibility is that realistic acceptance may lead people to ignore relevant symptoms, to fail to seek prompt medical attention, or to comply poorly with medical treatment. However, analyses suggested that men high in realistic acceptance were as careful as the men low in realistic acceptance to take care of their health and were somewhat more rather than less likely to be taking AZT. A fourth possibility is that realistic acceptance might work its effect on survival time by altering mood or emotional states. That is, those accepting their death may greet that realization with depression, whereas those who maintain unrealistic

optimism may be happier. However, analyses that controlled for psychological distress—including the emotions of hopelessness, anger, anxiety, guilt, and depression—suggest this route is not accounting for the longer time to death either.

The results of this study suggest, then, that the customary explanations for the effects of psychosocial factors on the course of illness cannot address this pattern of results. Instead, cognitive beliefs reflecting the realistic acceptance of the likelihood of death are associated with a faster course of disease, and unrealistically optimistic beliefs are associated prospectively with somewhat greater longevity. Further, there is no evidence that unrealistic optimism simply prolonged the final stages just before death. All of the men were weakening and had somewhat restricted their activities, but there was no evidence that the unrealistically optimistic men remained in the last phase of life longer than those with a rapid course of death. The study also suggests that a previously unexplored variable in the relation of psychosocial predictors, namely positive versus negative expectations about one's illness, is related to disease course. Because this concept is grounded in an established model of psychological adjustment to illness, it provides a strong theoretical position from which to design subsequent investigations.

HIV Infection, Bereavement, Negative Expectations, and Symptom Onset

To pursue these issues further, we (Reed, Kemeny, Taylor, & Visscher, 1999) conducted a prospective six-year longitudinal investigation of the psychosocial predictors of disease progression, also with the MACS, that enrolled men infected with HIV who were asymptomatic. The study had several purposes. The first was to see if a relationship between realistic acceptance and HIV progression could be observed at other points in the disease process, and especially whether expectations constitute a psychosocial predictor of more rapid disease course in those who have not experienced symptoms previously.

A second purpose was to explore these relations in the context of bereavement. As noted earlier, intensely stressful events such as illness are often associated with correlated stressors, which may themselves exacerbate the course of disease. One of the most common correlated stressors among men with HIV infection is bereavement, and so examining these issues in the context of bereavement permits an examination of another pathway by which psychosocial resources and illness progression may be related. Previous work has suggested that AIDS-related bereavement may be associated with disease progression in HIV-infected individuals (Kemeny et al., 1995; Kemeny & Dean, 1995). At the very least, these findings suggest the importance of controlling for bereavement when examining the relation of realistic acceptance to health outcomes in the context of HIV, because reactions to bereavement may exacerbate the course of disease or psychological states related to the course of disease, such as depression.

A more intriguing possibility, suggested by Kemeny's research on bereavement and immune changes in men with



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HIV infection (Kemeny et al., 1994), is that the experience of losing close friends or a partner to AIDS might potentiate the effects of negative expectations. That is, the participants in this study were infected with HIV, but they were asymptomatic, and consequently their negative expectations, although present, may not have loomed very large in their lives. However, among those who had been bereaved and who had direct, firsthand experience with a close friend or partner who had died of AIDS, negative expectations may have taken on a strength, clarity, and specificity that had psychological significance and ultimately significance for health outcomes as well.

For this study (Reed et al., 1999), we expanded our assessment of negative expectations based on a factor analysis of scales measuring psychological responses to the risk of HIV progression. From this analysis, we derived a general measure of expectations, including the original four realistic acceptance items, as well as conceptually related items that included the perceived risk that one's disease would progress, perceived control over the risk of disease progression (reverse scored), confidence that the disease would progress, and AIDS-specific optimism (reverse scored). A person with a high score on the negative HIV-specific expectancies factor, then, perceives himself to be at high risk for disease progression, believes that he has little control over that risk, experiences a low level of confidence regarding the risk of disease progression, reports that he accepts and prepares for the possibility of deteriorating health, and has a low level of optimism regarding the future course of his illness. We expected that high scores on this measure would predict a more rapid onset of HIV-related symptoms among these previously asymptomatic men over the three-year time period, either alone or in conjunction with bereavement.

To obtain the sample, we screened members of the MACS to include men who knew they were HIV seropositive, had CD4 T lymphocyte data over a two-and-a-half- to three-and-a-half-year follow-up period, and were asymptomatic initially with respect to HIV symptoms. Seventy-two men met these criteria. Thirty-seven of the 72 participants were bereaved, having experienced the death of a close friend or primary partner within the 12 months prior to the psychosocial assessment. The psychosocial assessment consisted of the same questionnaires as described in the first study, which included the HIV-related expectancies measures. In addition, we had data from the Profile of Mood States (POMS; which assesses current mood state) and the Center for Epidemiological Studies Depression Scale (CES-D; as a measure of depression). Hierarchical regression analyses were conducted to identify predictors of symptom appearance during the follow-up period. About half the sample showed illness progression through the appearance of one or more criterial symptoms associated with advancing disease, including persistent diarrhea, unintentional weight loss, persistent fevers, and persistent night sweats.

Among bereaved participants, high scores on the negative HIV-specific expectancies measure were associated with a greater likelihood of symptom development during the follow-up period. Specifically, about two thirds of the men in this group developed symptoms, compared with between 40% and 50% in all other conditions. This relation is not changed when immune parameters, AZT, substance abuse, depression, or high-risk sexual behavior is entered into the equation.

In this study, then, we found that negative HIV-specific expectancies were a significant predictor of the onset of prognostically relevant symptoms for AIDS among previously asymptomatic HIV-seropositive gay men, but primarily among those who had also been bereaved. This pattern of findings supports the hypothesis that the experience of AIDS-related bereavement can potentiate the effects of negative expectations, leading to adverse health effects.

As in the previous study, there was little evidence that the pattern was mediated by the traditional routes that have been studied by health psychologists seeking to understand the effects of psychosocial variables on disease progression. Controlling for health habits does not diminish the effect, nor is the pattern affectively mediated: Controls for mood and for depression yielded no evidence that these relations were mediated by affective changes. The study, then, suggests that negative as opposed to positive expectations are associated not only with a more rapid progression toward death among those diagnosed with AIDS but with a more rapid onset of symptoms in those who had previously been asymptomatic.

Our findings thus far reveal the importance of psychosocial resources that guard against the development of negative expectations. They suggest that a realistic appraisal of one's situation—namely, the potential for deteriorating health—contributes to a more rapid course of the very condition that is most feared. However, these studies

have not provided an indication of what psychological states may be most protective of health. We now turn to this issue.

Discovery of Meaning and Illness Progression

In a 1983 article on cognitive adaptation, Taylor (1983) suggested that positive illusions may be adaptive in the face of life-threatening illnesses, in part because they help people find meaning in the experience (cf. Frankl, 1963; Yalom, 1980). The possibility that stressful life events may provoke positive psychological changes, including finding meaning from the experience, has gained increasing recognition in the literature on recovery from trauma (e.g., Affleck & Tennen, 1996; Ickovics & Park, 1998; Janoff-Bulman & McPherson Frantz, 1997; Schaefer & Moos, 1992; Tedeschi & Calhoun, 1995; Tedeschi, Park, & Calhoun, 1998). Although there is substantial evidence that the ability to find meaning in a traumatic or stressful event, including a serious illness, is often psychologically adaptive (Mendola, Tennen, Affleck, McCann, & Fitzgerald, 1990; Schwartzberg, 1993; Thompson, 1991), there has previously been little effort to relate the discovery of meaning to disease states. In essence, then, we turned the question that guided the previous investigations on its head: Negative expectations may exacerbate disease course; can positive mental states slow it down?

There is some evidence that finding meaning is related to disease course. Affleck and his associates (Affleck, Tennen, Croog, & Levine, 1987) found that men who had sustained a heart attack and who perceived that they had obtained some benefits from that heart attack, including a change in their philosophy of life or values, were less likely to have a subsequent attack. They also exhibited less cardiac morbidity over an eight-year follow-up period. Because of the nature of the study design, however, it was not possible to look at the intervening physiology or the specific mechanisms by which these protective effects took place.

Cognitive processing of the implications of a trauma may also have positive effects on adjustment. Horowitz (1986), for example, argued that traumatic events often provide new information about oneself or the world that may disturb one's existing schemas and that such experiences must be worked through until the schemas evolve to match the reality of the events. Janoff-Bulman (1992) and Silver, Boon, and Stones (1983) have described the effects that traumatic experiences can have on basic assumptions about the self and the world, which may lead to extensive cognitive processing and mental rumination in an effort to make sense of the experiences. Notably, their findings emphasize the potentially deleterious effects that ruminative thought can have in the absence of finding meaning in the event. Among other implications, these divergent patterns of empirical findings suggest the importance of distinguishing between finding meaning, which appears to be beneficial to adjustment, and cognitive processing more generally, which may be either beneficial or deleterious for adjustment.

For this study, we (Bower, Kemeny, Taylor, & Fahey, 1998) identified 40 HIV-seropositive men who had recently experienced the loss of a close friend or a partner to AIDS. We explored bereavement, because it is a traumatic event that is known to have adverse effects on the immune system, both in healthy populations and among those with HIV (Kemeny et al., 1994, 1995). Moreover, in the study just described, we had found that bereavement potentiated the adverse effects of negative expectations on health, and as such bereaved HIV-seropositive men appear to represent a high-risk group for whom finding meaning may be an especially valuable process. That is, if an HIV-infected bereaved man can find meaning in the bereavement experience, it could potentially prevent negative expectations from developing or from taking hold and consequently be protective against deteriorating health.

The data came from an intensive interview study of these bereaved men that dealt with their bereavement experience and the effects it had had on them (Bower et al., 1998). The interviews were transcribed and coded for evidence of cognitive processing and meaning. Cognitive processing was operationally defined as verbal statements reflecting deliberative, effortful, or long-lasting thinking about the death. For example, evidence of cognitive processing included such statements as "I think, in a spiritual way, I tried to understand it" and "I'm muddling through my own feelings of what could have been, what was, and what is, and I'm thinking of my future." A simple statement like "I think about him once in a while" would not be coded as an example of cognitive processing, whereas the statement "I've thought a lot about what his death might mean for me" would be.

Meaning was defined as a major shift in values, priorities, or perspective in response to the loss. Statements reflecting meaning indicated such changes as a greater appreciation for the loved one, an enhanced sense of living in the present, a perception of life as fragile and precious, or a commitment to enjoying life. Specific examples are "What his death did was snap a certain value into my behavior, which is, 'Listen, you don't know how long you've got. You've just lost another one. Spend more time with the people who mean something to you'" and "I would say that his death lit up my faith."

A participant was classified as low in cognitive processing if he had no or one cognitive processing statement and as high if he had two or more. Participants were classified as *no* on discovering meaning if they had no meaning statements and as *yes* if they did. The reliability of these classifications was acceptable for both cognitive processing ($\kappa = .67, p < .01$) and discovery of meaning ($\kappa = .60, p < .01$). To assess the effects of cognitive processing and finding meaning on course of illness, we related the cognitive processing and meaning measures prospectively to levels of CD4 T lymphocyte cells over a two- to three-year follow-up period and to AIDS-related mortality over a four- to nine-year follow-up period. In addition, as in the previous studies, we examined whether mood, depression, health behaviors, and other potentially confounding psychosocial factors might explain the relations between cog-

nitive processing, finding meaning, and progression of disease.

Sixty-five percent of the participants had engaged in active, deliberative, or long-lasting thinking about the death of the person for whom they were grieving and were classified as high in cognitive processing. A smaller number, 40%, had made shifts in their values, priorities, and perspectives in response to the loss. All but two of those who had found meaning in the experience were high in cognitive processing, but only some of those who had engaged in cognitive processing had found meaning, yielding three comparison groups.

Only the men who found meaning in the experience maintained their CD4 T helper cells over the follow-up period. Those who did not engage in cognitive processing or who engaged in cognitive processing but failed to find meaning showed a decline in CD4 T helper cells over the follow-up period. Cognitive processing in the wake of a traumatic event, then, is not sufficient to produce beneficial health effects, consistent with work by Janoff-Bulman, Silver, and others. Instead, benefits were confined to those who found meaning in the experience. Moreover, these effects remain significant when a variety of other variables are controlled for, including predictors of HIV progression (e.g., number of HIV-related symptoms and initial CD4 T helper cell levels), health habits (e.g., sleep, sexual practices, cigarette smoking, and alcohol consumption), and affective states (e.g., depression and loneliness). In all cases, the relationship between finding meaning and CD4 T helper cell decline remained significant. Cognitive processing and finding meaning were also not related to optimism or to negative affectivity. This pattern suggests that the relationship of finding meaning to the maintenance of CD4 T helper cells among the HIV-seropositive men is not emotionally mediated.

We also examined whether the discovery of meaning was associated with a lower rate of AIDS-related mortality. The association was significant. Only 3 of the 16 men who had found meaning in the bereavement experience died during the follow-up period, whereas half of those who had not found meaning died.

In summary, then, those men who had been able to find meaning in the bereavement experience involving a partner or friend appeared to be biologically protected. They showed a lower level of CD4 T helper cell decline, and they were less likely to die during the follow-up period. These findings suggest that to the roster of psychosocial states believed to be health protective should be added the ability to construe meaning from adverse circumstances: to be able to take an experience that, although tragic and upsetting, can nonetheless lead an individual to find personal lessons in the experience that will help that individual live the remainder of his or her life with an enhanced sense of purpose and an appreciation for the value of life.

Positive Psychology and Health

Observers of the human condition have long maintained that positive states of mind can lead not only to a more meaningful life but to a healthier one. Until the past decade,

however, these thoughtful observations were largely intractable to scientific efforts. With the development of rigorous methodological standards, including longitudinal research, appropriate measurement, and proper controls for biological and psychosocial confounds, it is now possible to test these ideas empirically.

Most of the research that has related psychosocial factors to changes in disease states has focused on negative psychological states, including depression, stress, grief, and loneliness. Yet, philosophers and, increasingly, scientists as well have noted that exposure to trauma and other stressful life events does not inevitably lead to depression and despair. Such experiences can also act as catalysts for reevaluating one's goals and priorities and for reestablishing a sense of self (Frankl, 1963; O'Leary & Ickovics, 1995; Schaefer & Moos, 1992). Increasing evidence indicates that the array of positive outcomes that may result from stressful events includes finding meaning in life, developing better coping skills, enhancing one's social resources, establishing important personal priorities, and recognizing the value of social relationships (Leedham et al., 1995; Petrie et al., in press; Rose et al., 1995; Shifren, 1996). To date, our work represents one of few efforts to document the beneficial effects of such experiences on physical health outcomes, although many researchers have noted the value of such experiences for restoring or maintaining mental health in the face of trauma.

What determines whether one has the ability to respond to stressful or traumatic events not with despair, depression, and purposelessness but with resilience and a renewed sense of purpose? As yet, the answers to such questions are not fully known (Ryff & Singer, 1998). Our work on cognitive adaptation to life-threatening events and on positive illusions (Taylor, 1983; Taylor & Brown, 1988), however, suggests that normal human perceptions, marked by a positive sense of self, a sense of personal control, and an optimistic, even unrealistically optimistic, view of the future, may represent reserve resources that not only help people manage the ebb and flow of everyday life but that assume special significance in helping people cope with intensely stressful and life-threatening events. Consistent with this perspective, in several studies researchers have found a relationship between dispositional optimism and reports of positive changes, benefits, or "growth" following stressful events (Curbow, Somerfield, Baker, Wingard, & Legro, 1993; Davis, Nolen-Hoeksema, & Larson, 1998; Tedeschi & Calhoun, 1996; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992). In the case of life-threatening illness, these resources may act as buffers against the reality of advancing disease and death to the point that people face such experiences not only with psychological benefits but also with more resilient physical resources as well. As the investigations described in this article indicate, realistic expectations about one's disease and its downward course appear to be associated with a more rapid course of disease, helping to bring about the reality those expectations embody. The ability to remain optimistic, even unrealistically optimistic, in the face of deterioration (Reed et al., 1994, 1999; Taylor et al., 1992)

and the ability to find meaning in adverse experiences appear to be physiologically protective (Bower et al., 1998).

Important questions remain about exactly how such effects are mediated. As yet, a viable neuroimmunological model of how positive psychosocial states exert these physically protective effects has not been tested, although the literature offers some hints as points of departure (e.g., Eppel, McEwen, & Ickovics, 1998; Futterman et al., 1994). In addition, the psychosocial routes are not entirely understood. In our investigations, we attempted to evaluate the most probable routes by which psychological states may exert their effects on course of illness. These include the practice of health habits that may enhance health, such as exercise, or that may reduce it, such as smoking and alcohol consumption, or the appropriate use of health care services. The ability to develop or enlist available social support has been shown to protect health in other contexts (e.g., House, Landis, & Umberson, 1988; Sarason, Sarason, & Gurung, 1997; Seeman, 1996), and we have evaluated it in preliminary fashion as a mode by which the health-protective effects of these cognitive changes, namely negative expectations and finding meaning, may have occurred. Finally, it is possible that positive psychosocial states are associated with affective states that, in turn, lead to a physiological state conducive to maintaining health. Indeed, much of the work in which psychosocial states and their relation to health outcomes have been examined has focused on affective states, such as depression, hostility, or anxiety (e.g., Frasure-Smith et al., 1995; Friedman & Booth-Kewley, 1987; Herbert & Cohen, 1993; Miller, Michel, O'Leary, & Mills, 1996). The implicit rationale for such a model is that depression, hostility, anxiety, and other emotional states are known to have physiological concomitants that provide hints about the pathways by which psychosocial states may affect bodily functioning and, in turn, the progress of disease.

None of our investigations provide support for any of these hypothesized routes (cf. Cole, Kemeny, Taylor, Visscher, & Fahey, 1995; Segerstrom et al., 1998). To be sure, the psychosocial states we have studied are affectively valenced, and so affective processes may still be implicated in these effects. For example, finding meaning may induce a state of peacefulness or calm that may produce effects on the autonomic nervous system, leading to the beneficial effects on immunity that we have found. Similarly, negative expectations may not result in full-blown depression but might produce a sense of discouragement that has physiological concomitants. However, given the consistency of the pattern and the failure to find evidence for affective mediation, the most likely explanation is that cognitive variables in their own right have health-related significance, at least in the progression of HIV. These variables include realistic acceptance in the first study, an expanded measure of negative expectations in the second study, and a conceptually related variable, finding meaning, in the third investigation. That is, cognition appears to represent an alternative route to the biology of disease progression by as-yet largely uncharted pathways (see Ke-

meny & Gruenewald, in press, for a discussion of this issue).

A remaining issue concerns the relation of positive and negative psychological states to each other. In the past, researchers have focused heavily on negative psychological states that compromise both mental and physical functioning. An emphasis on positive psychological states, as protective of mental and physical health, is a more recent focus, especially the relation of positive psychological states to illness outcomes. One question that arises is whether these states are polar opposites of each other or whether they represent qualitatively different responses. From an empirical standpoint, positive and negative psychological states, whether affective or cognitive, are typically negatively correlated but not at levels so high as to suggest redundancy. The neural circuitries of positive and negative affective and cognitive responses overlap but also diverge somewhat (see Panksepp, 1998, for a review). As the neural pathways by which both positive and negative psychological states interact with and exert effects on biological processes are increasingly uncovered, our understanding of the relationship between positive and negative psychological states will be improved.

Conclusions

The psychologically and physiologically protective functions of positive beliefs are only beginning to be understood. Rigorous research investigations from a variety of laboratories have now provided evidence, however, that such resources as meaning, a belief in personal control, and optimism not only help people adapt to stressful events more successfully but actually protect health. Although as yet we do not fully understand the biopsychosocial pathways by which such protective effects occur, the evidence is strong enough to justify considering these resources important weapons in the arsenal of prevention.

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