Psychological Aspects of Prognostic Judgments

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It is now widely acknowledged that the level of health functioning is governed by biopsychosocial processes rather than solely by biological factors (Bandura 1997; Engle 1977). Psychological determinants contribute to physical and functional status by their impact on habits that impair or enhance health and on biological systems that mediate health and physical dysfunction. Because psychosocial factors account for some of the variability in health functioning their inclusion in prognostic schemes can enhance their predictive power. Prognostic judgments activate psychosocial processes that can influence health outcomes rather than simply serve as nonreactive forecastings. This chapter examines some of the psychological mechanisms through which prognostic judgments and clinical interventions can alter the probabilities of health outcomes.

Psychosocial determinants of health status operate largely through the exercise of personal agency. Among the mechanisms of personal agency, none is more central or pervasive than people’s beliefs in their ability to exercise some control over their own health. This self-belief of personal control is called perceived self-efficacy, and is the foundation of human agency. Unless people believe that they can produce desired results by their actions they have little incentive to act or to persevere in the face of difficulties. Evidence from diverse lines of research shows that perceived self-efficacy operates as a common psychological mechanism through which psychosocial influences affect physical and functional status (Bandura 1997).

Perceived self-efficacy has diverse effects, each of which can influence health outcomes and how well people use their physical and cognitive capabilities (Bandura 1997, 1998). Such self-beliefs affect what people choose to do. They avoid activities they believe exceed their capabilities and as a result fail to develop competencies or experience declines through disuse. However, they readily undertake activities they judge themselves capable of handling. Self-efficacy beliefs also play a central role in the self-regulation of motivation. They determine how much effort people will exert in an endeavor, how long they will persevere in the face of difficulties and setbacks, and their resilience to adversity. The stronger the belief in one’s efficacy, the greater and more persistent are the efforts. When faced with obstacles and disabilities, people who are beset by self-doubts about their capabilities slacken their efforts or give up quickly. A resilient sense of personal efficacy thus provides the needed staying power for surmounting difficulties that inevitably...

arise in any undertaking. People’s beliefs in their efficacy also affect how much stress and depression they experience in taxing situations as well as their level of motivation. Stress and depression take their toll on the quality of health functioning.

Impact of Perceived Self-Efficacy on Health Functioning

There are two major lines of research on the psychosocial determinants of health outcomes in which perceived self-efficacy plays an influential role. The more basic level of research examines how psychosocial factors affect biological systems that mediate health and susceptibility to disease through the self-efficacy mechanism. Stress has been implicated as an important contributing factor to many physical dysfunctions. Controllability appears to be a key organizing principle regarding the nature of these biological stress effects. Exposure to stressors with a concomitant strong sense of coping efficacy has no adverse physiological effects. Exposure to the same stressors with weak coping efficacy, however, activates autonomic arousal and catecholamine and endogenous opioid systems (Bandura 1997).

Biological systems are highly interdependent. The types of physiological reactions that have been shown to accompany weak coping efficacy are involved in the regulation of immune systems. Hence, exposure to uncontrollable stressors tends to impair the function of the immune system in ways that can increase susceptibility to illness (Cohen et al. 1991; Herbert and Cohen 1993a; Kiecolt-Glaser and Glaser 1987; Maier et al. 1985; Shavit and Martin 1987). Lack of behavioral or perceived control over stressors increases susceptibility to bacterial and viral infections, contributes to the development of physical disorders, and accelerates the rate of progression of disease (Schneiderman et al. 1992). Building people’s capabilities to manage acute and chronic stressors increases immune functioning (Antoni et al. 1990; Gruber et al. 1988; Kiecolt-Glaser et al. 1985; Wiedenfeld et al. 1990). Depression has also been shown to reduce immune function (Herbert and Cohen 1993b). Depression is associated with increased infectious disease, development and spread of malignant tumors, and faster tumor cell growth. The effect of perceived efficacy on infectious disease may be partly mediated through its effects on depression.

Lifestyle habits can enhance or impair health. This enables people to exert some behavioral control over their vitality and quality of health. The second level of research is concerned with modifying habits that enhance or impair health and functional status. Self-efficacy beliefs affect every phase of behavioral change (Bandura 1997). They determine whether people even consider changing their health-related behavior, whether they enlist the motivation and perseverance needed to succeed should they choose to do so, and how well they maintain the changes they have achieved. Each of these change processes is discussed briefly in the sections that follow.

People’s beliefs that they can exercise some control over their health determine whether they consider changing their health habits or pursuing rehabilitative activities. Those who believe they lack what it takes to succeed see little point in even trying (Beck and Lund 1981) or, if they make an attempt, give up easily in the absence of quick results. Effective self-regulation of health behavior is not achieved through an act of will. It requires development of self-regulatory skills. To build a sense of controlling efficacy, people must develop skills to influence their own motivation and behavior. In such programs, they learn how to monitor the behavior they seek to change, how to set short-range, attainable subgoals to motivate and direct their efforts, and how to enlist incentives and social supports to sustain the effort needed to succeed (Bandura 1986). Once equipped with skills and belief in their capabilities, people are better able to adopt behaviors that promote health and to eliminate those that impair it. They benefit more from treatments for physical disabilities and their psychological well-being is less adversely affected by chronic impairments.

A growing body of evidence reveals that the impact of different therapeutic interventions on health outcomes is partly mediated through their effects on perceived self-efficacy. The stronger the perceived efficacy they instill, the more likely are people to enlist and sustain the effort needed to adopt and maintain health-promoting behavior. This has been shown in such diverse areas of health as level of postcoronary recovery (Ewart et al. 1983; Schröder et al. 1997; Taylor et al. 1985); recovery from coronary artery surgery (Allen et al. 1990; Bastone and Kerns 1995; Jensen et al. 1993; Mahler and Kubik 1998; Oka et al. ...
1996; Sullivan et al. 1998); coping with cancer (Berkham et al. 1997; Cunningham et al. 1991; Merluzzi and Martinez-Sanchez 1997) and end-stage renal disease (Devins et al. 1982); adherence to immunosuppressive medication in renal transplantation (Brus et al. 1999; DeGeest et al. 1995); coping with oral surgery (Litt et al. 1995) and gastrointestinal endoscopy (Gattuso et al. 1992); enhancement of pulmonary function in patients suffering from chronic pulmonary disease (Kaplan et al. 1984); countering the debilitating and distressing effects of chronic fatigue syndrome (Findley et al. 1998); decreasing the risk of osteoporosis through physical activity and calcium intake (Haran et al. 1998); reduction in pain and dysfunction in rheumatoid arthritis (Holman and Lorig 1992; Schiaffino et al. 1991); reduction of the pain of childbirth and elective vaginal over repeat cesarean delivery (Dilles and Beal 1997; Manning and Wright, 1983); elimination of tension headaches (Holroyd et al. 1984; Martin et al. 1993); management of chronic low back, neck, and leg pain and impairment (Council et al. 1988; Dolce 1987; Kawanto et al. 1995); modification of eating habits and disorders (Desmond and Price 1988; Glynn and Ruderman 1986; Love et al. 1985; Schneider et al. 1987); reduction of cholesterol through dietary means (McCann et al. 1995); adherence to medication and prescribed rehabilitative activities (Clark and Dodge 1999; Ewart et al. 1986b); adoption and adherence to programs of physical exercise (Desharnais et al. 1986; McAuley 1992; Oman and King 1998; Salis et al. 1986); self-management of diabetes (Grossman et al. 1987; Hurley and Shea 1992); regulation of sexual erectile functioning (Bach et al. 1999) control of sexual practices that pose high risk for transmission of AIDS (Bengel et al. 1996; McKusick et al. 1989; Walsh and Foshee 1998; Witte 1992); and control of addictive habits that impair health (DiClemente et al. 1995; Marlatt et al. 1995; Stephens et al. 1995). Meta-analyses confirm the influential role of self-efficacy beliefs across diverse domains of health functioning (Gilles 1993; Holden 1991).

Habit changes are of little value unless they endure. It is one thing to get people to change their health-related behavior; it is another thing to maintain those changes over time. People persist constantly over their own behavior, so they are in the best position to exercise influence over it.

Maintenance of habit change relies heavily on self-regulatory capabilities and the functional value of the behavior. This requires instilling a resilient sense of efficacy as well as imparting skills. Experiences in overcoming troublesome situations serve as efficacy builders. This is an important aspect of self-management because, if people are not fully convinced of their personal efficacy, they rapidly abandon the skills they have been taught when they fail to get quick results or suffer reverses. Studies of habit change show that a low sense of perceived self-efficacy increases vulnerability to relapse (Bandura 1997; DiClemente et al. 1995; Marlatt et al. 1995). Efforts at relapse prevention must be extended beyond personal change to provision of social support and guidance during difficult times. The strategies for strengthening perceived self-efficacy to enhance maintenance of health-promoting behavior and to reduce vulnerability to relapse will be considered later.

Self-Efficacy as a Prognostic Indicator

As the above research amply documents, health outcomes are not governed solely by biologically rooted factors. Psychological determinants are also contributors through their impact on both health-related behavior and biological systems that mediate health functioning. Perceived personal efficacy is a psychological prognostic indicator of the course that health outcomes are likely to take. Results of a program of research on enhancement of perceived physical and cardiac efficacy for postcoronary recovery may serve to illustrate several general issues regarding prognosis of health outcomes and the course they are likely to take.

About half the patients who experience myocardial infarctions have uncomplicated ones (DeBusk et al. 1983). The heart heals rapidly, and they are physically capable of resuming an active life. However, the psychological and physical recovery is slow for patients who believe they have an impaired heart. They avoid physical exertion; they fear that they cannot handle the strains in their vocational and social life; they give up recreational activities; and they fear that sexual activities will do them in. The recovery problems stem more from patients' beliefs that their cardiac system has been impaired than from physical
debility. The rehabilitative task is to convince patients that they have a sufficiently robust cardiovascular system to lead productive lives.

The initial study in this program of research demonstrated that having patients master increasing workloads on the treadmill strengthens patients’ beliefs in their physical capabilities (Ewart et al. 1983). The stronger their perceived physical efficacy, the more active they become in their everyday life. Maximal treadmill attainment, itself, is a weak predictor of patients’ level and duration of activity. Treadmill experiences exert their influence indirectly, facilitating recovery by raising patients’ beliefs about their physical and cardiac capabilities. Enhanced perceived efficacy, in turn, fosters more active pursuit of everyday activities.

Ewart and his colleagues have further shown that patients’ beliefs about their physical efficacy predicts compliance with prescribed exercise programs, whereas actual physical capability does not (Ewart et al. 1986a). This corroborates the earlier findings that the effect of treadmill experiences on activity level is largely mediated by changes in perceived self-efficacy. Patients who have a high sense of efficacy tend to overexercice, whereas those who doubt their physical efficacy underexercise at levels that provide little cardiovascular benefit.

Psychological recovery from a heart attack is a social, rather than solely individual, matter. The patients in the study illustrating this point were males. The wives’ judgments of their husbands’ physical and cardiac capabilities can aid or retard the recovery process. The direction that social support takes is partly determined by perceptions of efficacy. Spousal support is likely to be expressed in curtailment of activity if the husband’s heart function is regarded as impaired, but as encouragement of activity if his heart function is judged to be robust. In the program designed to enhance postcoronary recovery (Taylor et al. 1985), the treadmill was used to raise and strengthen spousal and patients’ beliefs in their cardiac capabilities.

Several weeks after patients had a heart attack, their beliefs about how much strain their heart could withstand were measured. They then performed a symptom-limited treadmill, mastering increasing workloads with three levels of spouse involvement in the treadmill activity. The wife was either uninvolved in the treadmill activity; she was present to observe her husband’s stamina as he performed the treadmill under increasing workloads; or she observed her husband’s performance, whereupon she performed the treadmill exercises herself to gain firsthand information of the physical stamina required. We reasoned that having the wives personally experience the strenuousness of the task, and seeing their husbands match or surpass them, would convince them that their husband has a robust heart.

After the treadmill activities, couples were fully informed by the cardiologist about the patients’ level of cardiac functioning and their capacity to resume activities of daily life. If the treadmill is interpreted as an isolated task, its impact on perceived cardiac and physical capability may be limited. To achieve a generalized impact of enhanced self-efficacy on diverse spheres of functioning in daily life, the stamina on the treadmill was presented as a generic indicator of cardiovascular capability. The patients were informed that their level of exertion exceeded whatever strain everyday activities might place on their cardiac system. This would encourage them to resume activities in their everyday life that place weaker demands on their cardiac system than the heavy workloads on the treadmill. The patient’s and spouse’s beliefs concerning his physical and cardiac capabilities were measured before and after the treadmill activity and again after the medical counseling.

Figure 2-1 shows the patterns of change in perceptions of the patients’ physical and cardiac capabilities at different phases of the experiment under varying degrees of spousal involvement in the treadmill activity. Treadmill performances increased patients’ beliefs in their physical and cardiac capabilities. Initially, the beliefs of wives and their husbands were highly discrepant—husbands judged themselves moderately hearty, whereas wives judged their husbands’ cardiac capability as severely impaired and incapable of withstanding physical and emotional strain. Spouses who were either uninvolved in, or merely observers of, the treadmill activity, continued to believe that their husbands’ physical and cardiac capabilities were severely impaired. Even the detailed medical counseling by the cardiology staff did not alter their pre-existing beliefs of their husbands’ cardiac debility. However, wives
who had personally experienced the strenuousness of the treadmill were persuaded that their husbands had a sufficiently robust heart to withstand the normal strains of everyday activities. The participant experience apparently altered spousal cognitive processing of treadmill information, giving greater weight to indicators of cardiac robustness than to symptomatic signs of cardiac debility.

The change in perceived efficacy made the wives more accepting of the medical counseling. Following the medical counseling, couples in the participant spouse group had congruently high perceptions of the patients’ cardiac capabilities.

The findings further show that beliefs of cardiac capability can affect the course of recovery from myocardial infarction. The higher the patients’ and the spouses’ beliefs in the patients’ cardiac capabilities, the greater was the patients’ cardiovascular functioning as measured by peak heart rate and maximal workload achieved on the treadmill 6 months later. The joint belief in the patients’ cardiac efficacy proved to be the best predictor of cardiac functional level. Initial treadmill performance did not predict level of cardiovascular functioning in the follow-up assessment when the influence of perceived efficacy is removed. But perceived cardiac efficacy predicted level of cardiovascular functioning when initial treadmill performance was partialled out.

Wives who believe that their husbands have a robust heart are more likely to encourage them to resume an active life than those who believe their husbands’ heart is impaired and vulnerable to further damage. The positive relation between the wife’s perceptions of her husband’s cardiac capability and his treadmill accomplishments months
/issues in prognosis

later is, in all likelihood, partly mediated by spousal encouragement of activities during the interim period. Pursuit of an active life improves the patient's physical capability to engage in activities without overtaxing their cardiovascular system.

Coronary artery bypass surgery improves physical capacity; however, for some patients it produces little improvement or even deterioration in physical and social functioning. Studies of these diverse outcomes reveal that preoperative belief in one's physical efficacy is a good predictor of engagement in everyday physical and social activities, whereas physiological capacity, pre-operative severity of cardiac disability, number of coexisting medical problems, number of bypass grafts, age, or perceived exertion are nonpredictive (Allen et al. 1990; Oka et al. 1996). Intervention studies further corroborate that perceived self-efficacy is a common pathway through which psychosocial influences affect health outcomes across diverse types of diseases (Holman and Lorig 1992; Kaplan et al. 1984; O'Leary et al. 1988).

Prognostic judgments are not simply nonre-active forecasts of a natural history of a disease. Except in extreme pathologies that may be overwhelmingly determined by biological factors, the nature and course of clinical outcomes is partly dependent on psychological sources of influence. Strong belief in one's capability to exercise some control over one's physical condition serves as a psychological prognostic indicator of the probable level of health functioning. Thus, people with similar levels of physical impairment can achieve different functional outcomes depending on their self-beliefs of efficacy (Kaplan et al. 1984; Lorig et al. 1989; O'Leary et al. 1988). Even in the case of severe permanent impairment, where only partial recovery is possible, psychosocial factors will affect how much of the remaining functional capacity is realized. Because prognostic information can affect patients' beliefs in their physical efficacy, diagnosticians not only foretell but may partly influence the course of recovery from disease. This effect will be examined shortly in greater detail.

Mode of Conveying Prognostic Information

Another important issue in the clinical management of patients concerns the way in which prognostic information is conveyed to them. This is usually done by describing possible outcomes and the probabilities associated with them. However, verbal prognostications alone may not have the intended impact, especially when they run counter to strong pre-existing beliefs, as is often the case. This is true even for positive prognostications if patients invest the medically prescribed restorative activities with grave risks. For example, in the study of postcoronary rehabilitation, wives were not in the least reassured of their husbands' cardiovascular hardness by the positive prognostic judgments of the medical staff unless they had the benefit of direct confirmatory experiences.

To increase their persuasive influence, clinicians may have to convey positive prognostic information to their patients not only by word but also by structuring performance tasks for them that provide self-convincing experiences. This is an issue that will be explored later when discussing strategies for instilling a sense of personal efficacy and reducing vulnerability to relapse.

Psychological Impact of Diagnostic Procedures

The manner in which diagnostic tests are conducted also can influence patients' beliefs about their efficacy, as in the cognitive processing of somatic information from the treadmill test. Treadmill activity produces a multitude of negative signs, such as fatigue, pain, shortness of breath, and other exercise-induced symptoms, which mount as the task continues. Patients who focus on their physical stamina as they master increasing workloads will judge their cardiac system as more robust than those who selectively attend to and remember the negative somatic signs. Positive indicants of capability can be made more salient by providing patients with ongoing feedback of their performance attainments as they master heavier workloads. Judgment of cardiac efficacy will vary depending on how this diverse symptom information and the indicants of cardiac robustness are weighted and integrated.

This is shown in a study with a group of healthy men and women who completed a symptom-limited treadmill before entering an exercise program (Juneau et al. 1986). Half the participants received concurrent feedback of the increasing workload they were attaining during the course of the treadmill task. The other half received the
feedback about the workloads they attained just after they had completed the treadmill task. Their perceived cardiac efficacy was measured before and after the treadmill performance. They also recorded the physical signs they recall having experienced during the treadmill activity. Figure 2-2 shows how treadmill performances with and without concurrent feedback affect self-beliefs of cardiac capabilities.

In the absence of feedback of positive indicators of physical capability, exercise-induced symptoms completely dominate attention and memory representation of the treadmill experience. For healthy men, who generally have a more resilient conception of their cardiac capabilities, a taxing treadmill test without concurrent feedback did not alter their beliefs that they have a robust cardiac system. However, positive feedback that makes physical attainments on the treadmill more noticeable raised women’s judgments of their cardiac capabilities. In the absence of such feedback, women read the mounting negative somatic sensations accompanying increasing exertion on the treadmill as indicators of cardiac deficiencies and lowered their judgments of their cardiac capabilities. Women did not experience any more negative somatic sensations than did men. The adverse impact of treadmill experiences without positive feedback stemmed from negative cognitive processing of symptom information rather than from greater amounts or salience of such symptoms.

Preconceptions tend to bias how information is weighted and integrated (Bandura 1986; Nisbett and Ross 1980). A similar process is indicated in women’s reactions to delayed positive feedback regarding their treadmill performances. When told of their notable physical attainments, they raised their perceived cardiac efficacy to their pretreadmill level, but they achieved no net gain from the treadmill experience. Positive signs of cardiac capability are difficult to assimilate after conceptions of one’s efficacy have already been formed under conditions in which negative signs clearly predominate. A coronary can markedly undermine beliefs concerning one’s cardiac efficacy. A strong preconception of physical impairment makes negative physiological reactions to performance tests highly salient and recallable. Therefore, concurrent positive feedback of physical stamina would be especially important in countering beliefs of a frail cardiac capability in postcoronary patients who have not suffered clinical complications.

Figure 2-2. Impact of treadmill diagnostic performances on judgment of cardiac efficacy under conditions in which participants received concurrent feedback of the workloads they mastered or the feedback about their attainments was delayed until after the treadmill test was completed. (From Juneau et al. 1986.)
Any diagnostic procedure that gauges impairments and capabilities by testing the upper limits of performance will create a pattern of experiences reflecting both strengths and deficiencies. Patients who selectively notice and recall their performance deficiencies will judge their capabilities to be lower than those who notice their strengths as well. As shown in the preceding treadmill experiment, the adverse impact on perceived cardiac efficacy of diagnostic procedures that generate negative experiences can be reduced or counteracted by structuring performance tests in ways that give salience to one's remaining strengths. In addition to the type and timing of verbal feedback given to patients, there is some evidence to suggest that diagnostic tasks that create mounting failure by an ascending order of difficulty produce more adverse effects than if tasks of different levels of difficulty are intermixed to maintain a sense of attainment (Zigler and Butterfield 1968). Analysis of how the structure of diagnostic procedures and preconceptions of personal efficacy bias attention to, and cognitive processing of, somatic and behavioral information is of considerable clinical import as well as of theoretical interest (Cioffi 1991). The knowledge gained from these types of microanalytic studies would add greatly to our understanding of the psychological impact of experiences occasioned by diagnostic procedures.

Scope of Prognostic Schemes

Another issue regarding prognosis concerns the range of factors included in a prognostic scheme, specifically whether health outcomes are viewed solely from a biomedical perspective or from a broader biopsychosocial perspective. As will be recalled from the earlier discussion, level of health functioning and quality of life are determined not only by the patients' physical status but also by a system of social influences that can enhance or impede the progress they make. For example, in the study of recovery from uncomplicated myocardial infarction, wives' beliefs in their husbands' cardiac robustness were better predictors of level of recovery of cardiac function than were physical indices of cardiovascular status as measured by the treadmill.

To the extent that the interpersonal influences contribute to health outcomes, giving these factors some weight in prognostic schemes will enhance their predictive utility. If no notice of them is taken, one is left with puzzling variability in the courses that health changes take and the unexplained differences in functional attainments of people who are equally physically impaired.

Self-Validating Potential of Prognostic Judgments

Because prognostic information can affect patients' beliefs in their personal efficacy, diagnosing not only foretell but may partly influence the course of recovery from disease. Health outcomes are related to predictive factors in complex, multidetermined, and probabilistic ways. Prognostic judgments, therefore, involve some degree of uncertainty. The predictiveness of a given prognostic scheme will depend on the number of relevant predictors it encompasses, the relative validities and interrelations of the predictors, and the adequacy with which they are measured. There is always leeway for expectancy effects to operate because prognostic schemes rarely include all of the relevant biological and psychosocial predictors and even the predictors that are singled out usually have less than perfect validity. Based on selected sources of information, diagnosticians form expectations about the probable course of a disease. The more confident they are in the validity of their prognostic scheme, the stronger are their prognostic expectations.

Prognostic expectations are conveyed to patients by attitude, word, and the type and level of care provided them. As alluded to earlier, prognostic judgments have a self-confirming potential. Expectations can alter patients' beliefs about their capabilities and their behavior in ways that confirm the original expectations. Evidence indicates that the self-efficacy mechanism operates as one important mediator of self-confirming effects. This is most clearly revealed in laboratory studies in which arbitrary information of personal capabilities is conveyed to people and its effects on their perceived self-efficacy and behavior are then measured. Self-management of pain provides a relevant example.

There are several ways by which perceived coping efficacy can facilitate the personal management of pain. People can exercise some control over their level of experienced pain through attentional and other cognitive activities that re-
duce consciousness of pain sensations or alter their aversiveness by how they are construed. People who believe they can alleviate pain enlist whatever ameliorative skills they have learned and persevere in their efforts. Those who judge themselves as ineffectual make no effort to do so or give up readily in the absence of quick relief. A sense of coping efficacy also reduces distressing anticipations that create aversive reactions and bodily tension, which only exacerbate pain sensations and discomfort.

Consciousness has a very limited capacity. It is hard to keep more than one thing in mind at the same time. If pain sensations are supplanted in consciousness, they are felt less. Dwelling on pain sensations only makes them more noticeable and thus more difficult to bear, whereas people can become oblivious to their bodily sensations when deeply engrossed in activities that command their attention. Perceived self-efficacy can lessen the extent to which painful stimulation is experienced as conscious pain by supporting engrossment in activities of high interest that can occupy one's consciousness for hours on end (Bandura 1997; McCaul and Malott 1984). Findings of studies of chronic clinical pain accord with this view (Jensen et al. 1991). Perceived self-regulatory efficacy predicts the use of behavioral and cognitive strategies to relieve pain after controlling for pain severity and outcome expectations. Lin and Ward (1996) provide further evidence that perceived efficacy can relay pain by supporting palliative coping activities and creating the motivation to stick to them. People's beliefs in their pain-management efficacy reduced the intensity of low back pain and how much it interfered with daily life both directly and by fostering the use of cognitive and behavioral strategies that help to relieve pain.

The causal contribution of perceived efficacy to the self-management of pain has been verified experimentally. People given bogus feedback that they are good pain controllers raised their perceived self-efficacy and tolerance of cold pressor pain. In contrast, those led to believe that they were poor pain controllers lowered their perceived efficacy and found it hard to bear pain (Litt 1988). Instated perceived efficacy was a better predictor of pain tolerance than was past level of actual pain tolerance. A low sense of efficacy constrained efforts to ameliorate pain even when the opportunity to exercise some personal control existed. Arbitrarily altered efficacy beliefs also affected preference for personal or external control of pain. Those whose efficacy was raised preferred a strong personal role in the management of their pain; those whose efficacy was lowered wanted external interventions to stop their pain. People who believe they can exercise some pain control are also likely to interpret unpleasant bodily sensations and states more benignly than those who believe them is nothing they can do to alleviate pain (Cioffi 1991). Focusing attention on the sensory, rather than the affective, aspects of pain also reduces distress and raises pain tolerance (Acheson et al. 1983). Even at an early age, some children discover effective pain control strategies on their own (Ross and Ross 1984). They often rely on engrossing attentional strategies when pain sensations are hard to displace from consciousness or they make them easier to bear by transforming their meaning.

Perceived efficacy mediates the analgesic potency of various psychological procedures. Cognitive techniques for alleviating pain, self-relaxation, and placebos all increase perceive efficacy both to endure and to reduce pain (Bandura et al. 1987; Reese 1983; Williams and Kinney 1991). The more self-efficacious people judge themselves to be, the less pain they experience in later cold pressor tests, and the higher is their pain threshold and pain tolerance.

Holroyd and his colleagues (1984) demonstrated with sufferers of recurrent tension headaches that the benefits of biofeedback training stem more from boosts in perceived coping efficacy than from the muscular exercises themselves. Perceived self-efficacy, created by bogus feedback that one is a skilled relaxer for controlling pain, predicted reduction in tension headaches, whereas the actual amount of change in muscle activity achieved in treatment was unrelated to the incidence of subsequent headaches.

Research on mechanisms governing self-management of pain focus heavily on ability to endure or alleviate experienced pain. Lackner and his associates extended the analysis to beliefs in efficacy to perform physical activities essential for everyday functioning that generate pain (Lackner et al. 1996). The patients with chronic pain sufferers with low back pain. Occupationally injured patients judged their efficacy for lifting, bending, carrying, pushing, and pulling objects. To test al-
terative regulatory mechanisms, the patients also rated their expectations that these physical activities would cause pain and reinjury. Perceived efficacy predicted performance of physical activities after controlling for pain and reinjury expectations. Neither expectations of pain intensity nor reinjury predicted level of physical function when the effects of efficacy beliefs were removed.

That perceived efficacy makes pain easier to manage is further corroborated by other studies of acute and chronic clinical pain (Council et al. 1988; Dolce 1987; Manning and Wright 1983; Holman and Lorig 1992). Treatment gains in perceived efficacy to control pain not only reduce intensity of experienced pain in long-term assessments but also increase physical functioning as measured by trunk strength and range of motion and flexion-extension movements in patients suffering from degenerative disc disease (Altmair et al. 1993; Kaivanto et al. 1995). Belief that one can exercise some control over pain and one’s physical functioning is also accompanied by fewer pain behaviors, less mood disturbance, better psychological well-being, and more active involvement in everyday activities (Affleck et al. 1987; Buescher et al. 1991; Buckelew et al. 1994; Jensen and Karoly 1991). Perceived coping efficacy predicts level of pain after controlling for disease severity, demographic factors, and depression. A strong sense of postoperative efficacy to manage pain similarly predicts use of pain medication during recovery from coronary artery surgery (Bastone and Kern 1995).

The findings of experiments in which efficacy beliefs are raised or lowered by bogus feedback should not be taken to mean that arbitrary persuasion influence is a good way of enhancing beliefs of personal efficacy to reduce functional impairments associated with clinical conditions. Rather, such studies have special bearing on the self-confirming potential of prognostic judgments because efficacy beliefs are altered independently of actual physical status. In clinical practice, personal efficacy is strengthened by providing patients with the knowledge, coping skills, and self-assurance to make optimal use of their capabilities.

The preceding experimental analyses of self-confirming processes focused solely on how people’s self-beliefs of efficacy and behavior are affected by what they are told about their capabilities. Other evidence suggests that prognostic judgments may bias how people are treated as well as what they are told. In these experiments, instructors are arbitrarily led to form either high or low expectations for those they serve. The studies generally reveal that instructors treat others differently under high than under low expectations in ways that tend to confirm the original expectations (Jones 1977; Jussim 1986). Although there is some variation in results, the findings generally show that under induced positive expectations instructors pay more attention to those in their charge, provide them with more emotional support, create greater opportunities for them to build their competencies, and give them more positive feedback than under induced low expectations.

Differential care that promotes in patients different levels of personal efficacy and skill in managing health-related behavior can exert stronger impact on the trajectories of health functioning than simply conveying prognostic information. The effects of verbal prognostications alone may be short-lived if they are repeatedly disconfirmed by personal experiences due to deficient capabilities. However, a sense of personal efficacy rooted in enhanced competencies fosters functional attainments that create their own experiential validation. Clinical transactions operate bidirectionally to shape the course of change. The functional improvements in patients fostered by positive expectancy influences further strengthen clinicians’ beneficial expectations and their sense of efficacy to aid progress. In contrast, negative expectations that breed functional declines can set in motion a downward course of mutual discouragement.

Conception of Ability

In recent years, major changes have occurred in the conception of human ability (Bandura 1990; Sternberg and Kolligian 1990). Ability is not a fixed entity that one does or does not have in one’s behavioral repertoire. Rather, it involves a generative capability in which cognitive, social, emotional, and motivational factors govern the translation of knowledge and skills into performance attainments. There is a marked difference between possessing subskills and being able to integrate them into appropriate courses of action for varied purposes and to execute them well under difficult circumstances. Thus, with the same set of
skills people may perform poorly, adequately, or extraordinarily depending on their thinking patterns, emotional states, and level of motivation.

The variable utilization of capabilities is illustrated in research on the impact of self-efficacy beliefs on level of memory functioning with advancing age (Bandura 1989; Berry 1987; Berry et al. 1989; Lachman et al. 1987). Human memory is an active constructive process in which information is semantically elaborated, transformed, and reorganized into meaningful cognitive representations that aid recall. People differ in how they construct memory and its changes with age (Lachman et al. 1995). Some view memory as a biological capacity that inevitably shrinks with age and is not personally controllable. Others view it as a set of cognitive skills that can be developed and maintained with effort. Those differences in conceptions of memory affect memory performance, with belief in memory as an improvable cognitive skill facilitating memory performance and belief in memory as a shrinking capacity impairing it. The stronger people believe in their memory capabilities, the more they devote to cognitively processing memory tasks. Higher processing effort, in turn, produces better memory performance. Perceived self-efficacy affects actual memory performance both directly and indirectly through level of cognitive effort. Those who regard memory as simply a biologically shrinking capacity have little reason to try to exercise any control over their memory functioning. They are quick to read instances of normal forgetting as indicators of declining cognitive capacity. The more they disbelieve their memory capabilities, the poorer the use they make of their cognitive capabilities.

The undermining efforts of disbelief in one’s capabilities may also be mediated through depression. A low sense of personal efficacy to fulfill desired goals and to secure things that bring satisfaction to one’s life creates depression. Dependent mood further diminishes beliefs in one’s capabilities (Kavanaugh and Bower 1985) in ways that can debilitate memory functioning. Indeed, West et al. (1983) found that depression is accompanied by a low sense of memory efficacy which, in turn, is associated with deficient memory performance.

Perceived memory efficacy predicts degree of improvement in memory performance following training in mnemonic aids (Rebek and Balcerak 1989). Self-efficacy retains its predictiveness when prior level of memory performance is controlled (Bandura 1989). However, young adults are more likely than older adults to raise their beliefs in their memory efficacy and to use the memory aids they have been taught in other types of memory tasks. Memory training in the elderly clearly requires more persuasive demonstrations that they can exercise some control over their memory in their everyday life by using cognitive strategies. This can be achieved by efficacy demonstration trials in which the elderly perform memory tasks with and without cognitive aids and observe that their memory improves when they use them. Modeling influences can be used to demonstrate how others have been able to improve their memory by habitual use of mnemonic aids. Persuasive influences that instill beliefs conducive to the use of memory skills can also help to raise elderly people’s beliefs in their memory capabilities.

There are different types of memory. Significant advances in understanding memory functioning, therefore, require multifaceted measures of people’s beliefs in their memory efficacy rather than a general measure. Evidence from diverse lines of research are consistent in showing that global measures sacrifice explanatory and predictive power (Bandura 1997).

Efficacy beliefs similarly contribute to level of physical functioning. This is most strikingly revealed in experiments in which beliefs of physical efficacy are raised in some people and lowered in others by bogus information unrelated to their actual physical capabilities (Weinberg et al. 1979). The higher the induced beliefs in one’s physical efficacy, the greater are the physical attainments. Deficient performances spur those with a high sense of efficacy to even greater physical effort, but further impair the performances of those whose efficacy had been undermined. Self-beliefs of physical efficacy arbitrarily heightened in females and arbitrarily weakened in males obliterate large pre-existing sex differences in physical strength. As in the cognitive domain, viewing physical ability as an inherent attribute lowers perceived self-efficacy, retards skill development, and saps interest in such activities (Jourden et al. 1991). The nonability determinants of functional attainments have now been amply documented in diverse domains of activity (Bandura 1990).
Ways of Instilling Resilient Self-Efficacy

People’s beliefs about their efficacy can be developed and strengthened in four principal ways (Bandura 1986, 1997a): The most effective means is through mastery experiences. Successes build a robust sense of efficacy. Failures undermine it, especially if failures occur often early in the course of developing competencies. Self-efficacy is best developed by tackling challenges in successive attainable steps that serve to expand competencies. Subgoal attainments provide indicators of mastery for enhancing a sense of personal efficacy and help to sustain motivation along the way. If subgoal challenges are set too high, most performances prove disappointing and reduce motivation to continue the pursuit. People who have a low sense of efficacy are especially easily discouraged by failure and are quick to attribute it to personal incapacities.

Neurological injuries that produce severe permanent impairments can be devastatingly demoralizing to patients and their families. Patients have to reorganize their perspective to learn alternative ways of regaining as much control as possible over their life activities. Goals need to be restructured in ways that capitalize on remaining capacities. Ozer (1988) illustrates effective ways of structuring goals couched in functional terms to minimize disabilities created by chronic neurological impairment. Focus on achievement of functional improvements rather than on degree of organic impairments helps to counteract self-demoralization. Making difficult activities easier by breaking them down into graduated attainable steps helps to prevent self-discouragement of rehabilitative efforts.

Development of resilient self-efficacy requires some experience in mastering difficulties through perseverant effort. If people experience only easy successes they come to expect quick results. Their sense of efficacy is easily undermined by failure. Some setbacks and difficulties in human pursuits serve a useful purpose in teaching that success usually requires sustained effort. People develop resilience by learning how to manage failure, how to recover from failed attempts and setbacks, and how to enlist social support for their efforts. After they become convinced they have what it takes to succeed, they persevere in the face of adversity and quickly rebound from setbacks. By sticking it out through tough times, they emerge from adversity with a stronger sense of efficacy.

The second way of enhancing personal efficacy is through social modeling. People partly judge their capabilities in comparison with others (Bandura 1991). Seeing people similar to oneself regain, by perseverant effort, some control over their life activities despite impairment raises observers’ beliefs about their own capabilities to lessen their disabilities. The failures of others coping with similar problems instill self-doubts about one’s own ability to manage similar tasks. Having ex-patients exemplify the active lives they are leading can be especially influential in strengthening beliefs that functional improvements are realizable. Seeing how others manage difficult conditions can alter beliefs of personal efficacy through ways other than social comparison. Efficacious models can teach competencies and effective strategies for dealing with taxing situations. Adoption of serviceable strategies raises perceived self-efficacy. People also draw inspiration from seeing others change their lives for the better.

Social persuasion is the third mode of influence. People try to talk others into believing they possess the capabilities to achieve what they seek. Realistic boosts in efficacy can lead people to exert greater effort, which increases their chances of success. However, to raise unrealistic beliefs of personal capability runs the risk of inviting failure. Successful efficacy builders, however, do more than express faith in people’s capabilities. They structure tasks for them in ways that are likely to bring improvements and avoid placing them prematurely in situations where they are likely to fail. By maintaining an efficacious attitude that functional gains are attainable when patients are beset with self-doubts, clinicians can help them to sustain their coping efforts in the face of reverses and discouraging obstacles. Through these various means clinicians can help patients to make the best use of their capacities.

People also rely partly on their physiological state in judging their capabilities. They read their anxiety arousal and tension as signs of vulnerability to dysfunction. In activities involving strength and stamina, people interpret their fatigue, aches, and pains as indicators of physical inefficacy. The fourth way of modifying personal efficacy is to equip patients with skills to reduce aversive phys-
ological reactions or alter how they interpret somatic information. The meanings assigned to bodily sensations and states can have significant health consequences (Bandura 1991; Cioffi 1991).

The health benefits of a sense of personal efficacy do not arise simply from the incantation of capability. Saying something should not be confused with believing it to be so. Simply saying that one is capable is not necessarily self-convincing, especially when it contradicts firm pre-existing beliefs. No amount of declaration that one can fly will persuade one that he or she has the efficacy to become airborne. Self-efficacy beliefs are the product of a complex process of self-persuasion that relies on cognitive processing of diverse sources of efficacy information conveyed behaviorally, vicariously, socially, and physiologically. Their strength is affected by the authenticity of the efficacy information on which they are based. Self-efficacy beliefs that are firmly established are resilient to adversity. In contrast, weakly held self-beliefs are highly vulnerable to change and negative experiences readily reinstate disbelief in one's capabilities.

Reduction of Vulnerability to Relapse

Each of the methods for enhancing efficacy can be used to develop the resilient sense of perceived efficacy needed to override difficulties that inevitably arise from time to time. With regard to the performance mode, a resilient belief in one's personal efficacy is built through repeated demonstration trials in the exercise of control over progressively more difficult tasks. For example, as part of instruction in cognitive pain control strategies, arthritic patients were given efficacy demonstration trials in which they performed pain-producing activities with and without cognitive control and rated the level of pain they experienced (O'Leary et al. 1988). Explicit evidence that they achieved substantial reduction in experienced pain by cognitive means provided persuasive demonstrations that they could exercise some control over pain by enlisting cognitive-control strategies. Efficacy validating trials not only serve as efficacy builders, but put to trial the value of the techniques being taught.

Modeling influences, in which other patients demonstrate how to cope with difficulties and setbacks and show that success usually requires tenacious effort, can further strengthen perceived self-efficacy. Moreover, modeled perseverant success can alter the diagnosticity of failure experiences. Eventual accomplishments indicate that earlier failures partly reflect difficult task and situational factors rather than solely inherent personal deficiencies. Under this cognitive set, difficulties and setbacks prompt redoubling of efforts rather than breed self-discouraging doubts about one's capabilities. For example, pain threshold and tolerance is affected by modeling influences (Craig 1983). Thus, people who have seen others persevere despite pain function much more effectively when they themselves are in pain than if they had seen others give up quickly (Turkat and Guise 1983; Turkat et al. 1983).

Persuasive influence that instill self-beliefs conducive to optimal utilization of skills can also contribute to staying power. As a result, people who are persuaded they have what it takes to succeed and are told that the gains they achieved in treatment verify their capability are more successful in sustaining their altered health habits over a long time than those who undergo the same treatment without the efficacy-enhancing component (Blitner et al. 1978).

Concluding Remarks

The present analysis addressed the issue of prognosis from a biopsychosocial perspective on health and human agentic capability. Converging lines of evidence indicate that perceived self-efficacy operates as an important prognostic indicator of level of functioning. Strength of perceived self-efficacy can influence the course of health outcomes and functional status through its intervening effects on cognitive, motivational, affective, and biological processes. In social cognitive theory (Bandura 1986, 1997), perceived efficacy is part of a larger set of socicognitive factors that regulate human motivation, action, and well-being. People also motivate and guide their behavior by the physical, social, and self-evaluative effects they expect their efforts to produce. Personal goals and aspirations about the future one seeks to achieve and the intermediate plans and strategies for realizing that vision operate as another motivating force. Once people commit themselves to valued goals, they mount the effort needed to fulfill them. Perceived impediments, in
the form of personal, social, and institutional barriers, further affect self-motivation and emotional well-being. Efficacy beliefs play a pivotal role in the exercise of personal agency because they not only operate on behavior in their own right, but through their impact on these other determinants. People’s belief in their personal efficacy influence the goals and challenges they set for themselves, the outcomes they expect their actions to produce, and whether they view impediments as surmountable or as daunting obstacles over which they can exert little control.

Prognostic schemes that encompass sociocognitive determinants will have greater predictive power than those that ignore them. Moreover, prognostic evaluations have a self-confirming potential. Whether patients are expected to do well or to do poorly can affect their clinical management and beliefs in their capabilities in ways that confirm the original expectations. Patients are best served by prognosticists that enable them to realize their potential.

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