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Health Psychology: The Search for Pathways between Behavior and Health

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Abstract

This review of the current status of theoretically based behavioral research for chronic illness management makes the following points: (a) Behavioral interventions have demonstrated effectiveness for improving health outcomes using biomedical indicators, (b) current interventions are too costly and time consuming to be used in clinical and community settings, (c) translation of the conceptual models generated from studies of the problem-solving processes underlying self-management and the relationship of these processes to the self system and cultural and institutional contexts suggest new avenues for developing effective and efficient cognitive-behavioral interventions, and (d) it is proposed that integration of the conceptual developments in self-management with new approaches to the design of clinical trials can generate tailored, behavioral interventions that will improve quality of care.

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INTRODUCTION

Health psychology research needs to satisfy two goals: the development of theoretical models describing the processes underlying risky and healthy behaviors, and the creation of effective procedures for behavioral change

that are usable in clinical and community settings. The primary steps required for a practice-oriented theory are to increase the specificity and predictive power of theory by adding concepts generated from observations in clinical and community settings and to develop increasingly complex models to better understand how behavioral factors contribute to health outcomes. The steps required for practice are to develop interventions that are theory-based and are usable in clinical and community settings as well as effective for helping individuals initiate and sustain behaviors that will improve their personal health. These goals are reflected in the three major lines of research examined in previous contributions to the *Annual Review of Psychology*: biobehavioral studies of direct pathways from behavior to illness (e.g., stress illness research; Ader & Cohen 1993, Baum & Posluszny 1999), behavioral interventions to control these direct pathways (Kiecolt-Glaser et al. 2002, Schneiderman et al. 2001), and behavioral studies focused on the prevention and control of chronic conditions (Rodin & Salovey 1989). This review focuses on a subset of this third area of behavioral studies: the processes involved in initiating and maintaining behaviors for reducing risk and controlling existent chronic disease. These behaviors include lifestyle changes such as diet, exercise, and adherence to medication for reducing risk and control of diabetes, hypertension, and congestive heart failure. A narrow focus is necessary because it is impossible to cover in the space allotted the enormous number of behavioral studies that have appeared since a previous and able review by Rodin & Salovey (1989).

Our chapter is organized as follows: First, we provide a brief justification for focusing on prevention and control of chronic illnesses. We argue that the movement for evidence-based practice in the medical field has created pressure on health psychologists for effective and efficient (usable) theory-based behavioral interventions for the control of chronic illness. Second, we review

models and evidence respecting the self-management process, i.e., how people manage (control and prevent) chronic conditions in their home settings. This section is organized around the proposition that the social-cognitive-behavioral model, with an emphasis on cognitive processes, is the most comprehensive model for understanding behavioral processes relevant to health. Third, we briefly review new approaches to clinical trials for increasing the effectiveness of behavioral interventions and whether integrating these innovative approaches with self-regulation models could create interventions that are usable in clinical settings.

WHY FOCUS ON PREVENTION AND CONTROL OF CHRONIC ILLNESS?

Advances in public health and the economic well-being of populations in the early twentieth century in Western nations resulted in chronic conditions, such as cardiovascular diseases and cancers, replacing infectious diseases as one of the top ten killers in Western nations (Fries 2005, McKinlay & McKinlay 1977). The recent surge in HIV AIDS, an infectious condition, is not an exception to this trend, because existing HIV treatments are lifelong, i.e., chronic, and require chronic, intensive self-management (Siegel & Lekas 2002). Treatment of chronic illnesses also absorbs well over half of the health care budget of developed nations (McKinlay & McKinlay 1977), and because chronic conditions are more common with advancing age, the financial burden will increase as the population ages. The focus of this chapter on chronic illness management is congruent, therefore, with a major problem for society and the health care system. As human behaviors, including food intake, physical activity, and cigarette smoking, are causally related to both vulnerability and management of chronic conditions, it is fully justified to focus on their prevention and control (Baum & Posluszny 1999).

Narrowing the focus to behaviors for the prevention and management of chronic diseases sets constraints on how we cover the pathways to chronic illness that have been identified by social, behavioral, and biomedical investigators. For example, although statistical models have shown direct effects to health through economic, ecological, and cultural pathways (House et al. 1992, Kaplan 1992), we argue that many of these effects are produced by behavior. Failure to detect behavioral mediators at the individual level may be due to deficits in assessment of relevant behaviors and to narrow definitions of behavior that include only overt risky (smoking) or healthy (exercise) behaviors and ignore generalized behaviors or sets such as chronic vigilance. We also propose that direct pathways from psychological traits such as trait negative affect (trait NA) and cognitive competency to health are often mediated by behavioral factors, though many relationships between traits and health indicators reflect interactions of behaviors with third factors such as genetic make-up and/or gene expression. All of the pathways impact the individual and the individual's behaviors—healthy, risky, treatment adherence, and lifestyle behaviors. It is reasonable to expect, therefore, that the best way to affect health outcomes will be through the pathways influencing these behaviors.

EVIDENCE-BASED PRACTICE AND BEHAVIORAL INTERVENTIONS FOR CONTROLLING CHRONIC ILLNESSES

Translational Research and Evidence-Based Medicine

Translational research is critical for both theory and practice, and “the recasting of clinical science along the principles of evidence-based medicine provide[s] a better environment where translational research may now materialize its goals” (Ioannidis 2004, p. 5). The growth of evidence-based practice in

medicine has created pressure on health psychologists for effective and efficient theory-based behavioral interventions for the control of chronic illness. Even though clinical outcome trials provide information on the efficacy of treatments, the mechanisms for change are not delineated in clinical outcome studies, a fact that limits their use for practice and theoretical development, and so we must move beyond clinical outcome studies to translational research that investigates the effects of individual, theoretical components (Lerman 2003). In this way, our research can be translated for and used by those in clinical practice. A broad literature search was conducted using two Ovid information sources, PsycINFO and Medline, for randomized, controlled trials of behavioral interventions conducted in the past decade whose purpose was to study the prevention and management of chronic conditions. General subject terms were used in both search engines, including all terms that were related to "behavioral intervention" or "lifestyle intervention," "chronic illness," and "randomized trials." A total of 137 studies were collected using the specified search terms; the studies were then cut down to only those that met criteria of being behavioral interventions, using randomized and controlled trials, and having to do with chronic conditions in the past decade. The search results were further eliminated if they were related to drug addictions or smoking rather than chronic illnesses such as diabetes and heart failure. After all inclusion and exclusion criteria were implemented, 26 studies remained. Of these 26 trials, 21 reported significant and substantial benefits from a behavioral intervention. Although these trials are few in number, 80% of them produced some or all of their predicted benefits in health outcomes. Thus, the best trials clearly satisfied the key criterion for effectiveness—the behavioral changes reduced the onset and/or progression of chronic disease—but fell short of a second criterion: They were not efficient and usable in the vast majority of clinical settings, as has been the case for most effective in-

terventions (McDonald et al. 2002). In the following section, we focus on two diabetes prevention trials that are excellent examples of effective behavioral interventions, and then we address behavioral models that point to possible directions for achieving efficiency and/or the clinical usability of such behavioral interventions. To be clinically usable, behavioral interventions must be efficient, not only effective, so that physicians, nurses, and health institutions have the time and resources for implementation.

The Diabetes Prevention Trials

The Finnish Diabetes Prevention Study Group (Lindström et al. 2003, Tuomilehto et al. 2001), which conducted a randomized trial comparing lifestyle with standard-care treatment conditions, reported that 58% fewer lifestyle participants became diabetic relative to those in standard care over the average four years of its intervention. Most importantly, the benefit of lifestyle change was sustained for three years following termination of the intervention, though the effect shrank somewhat at final follow-up (58% to 46%). The trial of individuals at high risk for diabetes that was conducted in the United States (Diabetes Prev. Prog. Res. Group 2002) confirmed the Finnish findings; 58% fewer of the 1079 participants in the lifestyle intervention became diabetic in the 2.8-year post-intervention period (average per-participant observation) in comparison with the 1082 standard-care participants. The 1073 participants taking medication also fared better than control participants, 31% fewer became diabetic, though they fared significantly less well than the participants in the lifestyle intervention. The quality of these trials appears to be very high; adherence to the interventions was excellent (80% or more), and mediating factors, weight loss, and hours engaged in physical activity increased more in the lifestyle than in the control conditions. Although it is difficult to compare the time demands and extent of coverage for

specific topics in these complex interventions, the Finnish study appears to have been significantly less time demanding than that used by the U.S. working group (for reviews, see Heneghan et al. 2006, Tuomilehto et al. 2005).

Do the Trials Meet Criteria for Evidence-Based Practice?

Although the incidence of diabetes is clearly lower, and impressively so, for participants in lifestyle interventions than for those in control or medication treatment conditions (see Gillies et al. 2007, Yamaoka & Tango 2005), support for lifestyle interventions as an evidence-based practice requires that the interventions meet additional benchmarks. First, diabetes is a lifetime condition, and although the seven-year follow-up in the Finnish trial is encouraging, it remains to be seen if the behavioral changes and their benefits will be sustained over a lifetime and can be replicated in other trials. Second, there are issues of cost effectiveness and usability in clinical settings. The U.S. program involved 16 one-on-one, hour-long sessions with a cognitive-behavioral therapist as well as meetings with nutritionists and nurses and phone calls to reinforce and sustain behavior change. Economic analyses of the U.S. and a similar lifestyle program conducted in the United Kingdom suggest they are cost effective for the health care system and for society as a whole; the costs include direct medical and nonmedical expenses and various indirect costs (Diabetes Prev. Prog. Res. Group 2003, Teutsch 2003). Cost effectiveness on a national scale does not, however, translate into usability in clinical settings, where personnel skilled in the conduct of such interventions are lacking and the savings may go to units (e.g., hospitals) other than those in which interventions are conducted (e.g., specialty clinics). Furthermore, cost effectiveness on a national scale does not necessarily translate into cost effectiveness for the individual patient, the people for whom the intervention is aimed, because patient time is rarely

considered in cost analyses (Russell et al. 2005).

We propose that understanding the processes underlying how patients act to detect and manage chronic conditions will provide ideas for effective and efficient interventions. This proposal is consistent with, although different from, efforts to tune interventions to stages that define participants' readiness for change (Prochaska et al. 2005), to target the intervention to groups of participants, or to tailor the interventions to individuals' needs (De Bourdeaudhuij & Brug 2000). A review of tailored informational interventions (Ryan & Lauver 2002) concluded that they were significantly more effective than were standard interventions for some but not all types of behavior (e.g., effective for dietary behaviors but not for smoking behaviors), and these interventions were more likely to be effective when they used ipsative feedback, which compares a participant's present and past behaviors. All of the reviewed tailored informational interventions that were significant had only very small effect sizes. Therefore, although these interventions may be more efficient than the lifestyle interventions to date, they are not as effective. The challenge for interventions is to be effective and efficient, and therefore usable.

THE PROCESS OF SELF-MANAGEMENT OF CHRONIC ILLNESS

The creation of effective and efficient evidence-based practices requires something in addition to the translation of theory-based interventions to practice settings: These additions can be identified by the systematic investigation and conceptualization of the processes underlying how patients use treatments in their homes, workplaces, and communities—their lived environments. We propose that the incorporation of models and concepts developed in field settings into the conceptual structure of behavioral theory developed in laboratory settings, i.e., translation

from the field to the laboratory, will facilitate the development and testing of efficient and effective interventions for enhancing healthy behaviors. Translation from the field is critical given that medical treatments and lifestyle behaviors are performed in lived environments.

Factors Affecting Chronic Illness Management: Emotion and Cognitive Traits

Studies of health care usage, disease risk screening, and behavior for the prevention and management of chronic conditions provide insights into mechanisms underlying effective self-management behaviors. The social-cognitive-behavioral framework that is the basis for behavioral health research encompasses factors ranging from the cultural and social environment through individual or person factors, and most importantly, the behavioral processes that initiate and sustain healthy and risky behaviors. The framework encompasses a multilevel set of control systems (Carver et al. 1989, Cooper & Shallice 2006, Powers 1973), with each level generating goals and strategies that influence adjacent levels in the hierarchy. Understanding how variables interact either within or across levels is not captured by structural or hierarchical statistical models that depict the architecture of a system but do not describe its software, i.e., how factors communicate with one another. How factors communicate with one another is critical information for the design of interventions. For example, there is little evidence on how typical individual difference measures relate to within-individual variation in behavior over time because individual difference measures may not identify and assess the self-perceptions and strategies that control the temporal variation in intraperson problem solving (Cervone 2004). We illustrate these points below in our description of what is known about the processes involved in the regulation of treatment adherence behaviors.

Emotion traits. For more than 30 years, studies have reported on the relationship between individual differences in emotion characteristics and healthy and risky behaviors and health outcomes, e.g., mortality and morbidity. Although measures of negative affect such as trait anxiety are more or less consistent predictors of morbidity and mortality (Friedman & Booth-Kewley 1987), they are somewhat less effective in predicting healthy and/or risky behaviors (Mora et al. 2002, 2007). Individual differences in depressive affect and angry/hostile behavioral styles are somewhat an exception, as they have been consistent predictors of morbidity and mortality from cardiovascular disease (Barefoot et al. 1983). Questions about these relationships include the extent to which these constructs overlap with one another and with variables such as burnout and vital exhaustion, and whether they affect health through the same or through different physiological pathways (Suls & Bunde 2005).

Although studies have generally failed to detect robust direct effects of factors such as neuroticism or trait anxiety on care seeking, theory has suggested and data have identified indirect pathways that merit further examination. One such path shows, as predicted, that individuals with high scores on trait NA are more likely to report asthma-specific health worries that mediate the connection between trait NA and the reporting of symptoms specific to asthma. Asthma-specific worries, however, do not affect the relationship of the trait NA to reporting of generic, emotional symptoms (Moral et al. 2007). Thus, being high on trait NA increases susceptibility to feeling fearful in response to illness threats and focuses attention on the physical indicators of threat, allowing the individual to distinguish clearly between symptoms of illness and symptoms of emotional distress. Because illness-specific worry enhances attention to and accurate identification of illness symptoms, and because symptoms are powerful initiators of health behaviors, it is clear that illness-specific worry should predict seeking

health care; a specific worry, cancer worry, has been shown to predict cancer screening (Diefenbach et al. 1999, Hay et al. 2006). Imaging studies have identified neural centers that are likely the loci for memories that integrate symptoms, subjective worry, and action tendencies (Critchley 2005).

Depression appears to have direct effects on a range of health behaviors. For example, depression has been shown to reduce adherence to treatment in patients who have had a myocardial infarction (MI) (Ziegelstein et al. 2000), to reduce attendance at programs for lowering blood lipids post-MI and post-bypass surgery (Sebregts et al. 2003), and to delay care seeking following an MI (see review by Dracup et al. 1995) and bowel obstruction (Bickell et al. 2005). The data suggest, however, that these effects often reflect only one of the components of depression, i.e., its affective, cognitive, or somatic feature, and not the entire construct. For example, a cognitive component of depression, the belief that other people disrespect and dislike you, predicted reductions in perceived social support over a two-year period in a sample of 851 elderly individuals, whereas depressed mood and somatic symptoms had no relationship to reductions in perceived support (Maher et al. 2006). Social support is associated with better health outcomes (Cohen 2004), and thus its erosion would increase risk of illness, thereby defining an indirect pathway from depression to physical illness. Consistent with prior data (Dracup et al. 1995), interviews with 433 post-MI patients found that patients reporting depressive symptoms two weeks prior to hospitalization delayed longer (40+ hours) before seeking care in comparison with patients who did not report depressive symptoms (22+ hours; Bunde & Martin 2006). This direct effect however, was due entirely to two items in the Patient Health Questionnaire-9 depression measure: fatigue and sleep disturbance. Delay was not related to the other components of depression, mood, anhedonia, or feeling bad about the self, or to the neuroticism scale from the Big Five In-

ventory (Costa & McCrae 1992). The findings for white coat hypertension reported by Spruill and colleagues (2007) resonate with the Bunde & Martin (2006) data: situational fear levels and not trait anxiety were associated with (white coat) hypertension in the clinical setting; white coat hypertension was detected for individuals who had labeled themselves as hypertensive regardless of their actual ambulatory blood pressure status. Kemeny's (2003) summary of multiple studies also shows that situation-specific measures, and not general measure of stress, predict HIV progression. Thus, the results of these studies converge in showing that situation-specific rather than general conceptualizations and measurements of emotion concepts are needed to predict health outcomes (Leventhal et al. 2007a).

Cognitive/behavioral traits. The Big Five factor of conscientiousness and its subfactor of conventionality appear to have consistent, modest relationships with lower levels of risky and higher levels of healthy behaviors and better health outcomes (Bogg & Roberts 2004). A recent analysis of existent data found that teacher ratings of conscientiousness were positively related to better health in their former pupils 40 years later; some of the effect was clearly indirect, i.e., from conscientiousness through educational attainment and higher levels of healthy and lower levels of risky behaviors, although some of the relationship was direct and unaccounted for by mediators in the best-fitting model (Hampson et al. 2007). Conscientiousness may affect self-management at many points in the behavioral process: It may affect risk aversion, nondiscounting of remote rewards, skills in generating action plans, and/or adherence to well-organized, nonrisky, and not overly complex lifestyles (Park et al. 1999). Behavioral processes related to conscientiousness may play a role in the "healthy adherer effect" (Simpson et al. 2006); participants adherent to protocol in placebo conditions have been found to have outcomes as favorable as those of treated patients.

Summary comment. It is clear that person traits are related to health. What is not well understood is how person factors relate to specific behaviors or biological vulnerabilities that mediate these effects. The identification of the processes underlying how traits influence problem solving (i.e., how health threats are viewed, the strategies skills and specific responses for threat management) and how the outcomes of problem solving are evaluated and translated into intermediate beliefs (worries; strategies) requires analyses that focus on intraindividual assessment rather than individual-difference assessment. As Cervone (2004) argues, stable factors (traits) may have little or no relationship to the process-level variables that affect the day-by-day fluctuation in health-relevant behaviors. The identification of relationships to health behaviors and health outcomes of specific health worries, components of depression, or representations of specific self vulnerabilities, and behavioral styles specific to particular types of settings are consistent with the proposition that domain-specific person factors will better predict behavioral episodes over time. This is true because they are tuned to the specific cues, internal and external, that activate behavioral processes in that domain (Cervone et al. 2006). As we argue in the final section, understanding how moderators such as traits affect process-level variables will be critical for the development of effective and efficient interventions.

Factors Affecting Chronic Illness Management: Process Analyses

Studies have identified a broad array of cultural, community, and personal values and beliefs and associated triggering factors that initiate and sustain behaviors affecting the development of chronic illnesses. For example, obesity, a multiplier of risk factors for many chronic conditions (Pi-Sunyer 1993), is affected by factors ranging from availability and cost of healthy foods to cultural values associated with portliness and thinness, to individ-

ual pathology affecting food intake (Wadden et al. 2002). The picture for addictions, smoking, and alcohol use is equally complex; cultural, peer, and family environments as well as individual propensity to risk taking and emotional reactivity affect likelihood of initiation, rapidity of addiction, and difficulty of cessation (Galea et al. 2004, Turner et al. 2004). Models depicting the processes involved in healthy and risky behaviors typically place environmental factors (availability; cost; socioeconomic status) on the far left, belief variables such as personal vulnerability next, then triggers that activate these beliefs and motivate action, followed by response alternatives and their associated expectations (e.g., response efficacy and self-efficacy for execution), a plan for action (Bandura 1989, Leventhal 1970, MacGregor et al. 2006), and post-action satisfaction (Baldwin et al. 2006, Finch et al. 2005). Consistent with earlier data (Leventhal 1970), a combination of motivating variables (attitudes, intentions) and action variables, i.e., plans and efficacy (Leventhal et al. 1965, Sheeran & Orbell 2000), appears to be essential for healthy or risk-reducing behaviors; neither set alone appears to be sufficient to generate behavior (Leventhal 1970, Rothman 2000, Witte & Morrison 2000). For example, a recent study of volunteer parent participants in a smoking-cessation intervention found that predictors of participation in the program included recently receiving medical care, a motivating factor, and planning to make changes in smoking behavior (Mak et al. 2006). Action plans play a key role in converting attitudes to action; the associations are especially large with respect to performing single, time-limited behaviors such as screening for and inoculation against disease threats (e.g., Orbell et al. 1997). Suggestions as to how cultural-, social-, and person-level factors affect the processes involved in self-management of chronic illness are a central concern of this review because interactions among these factors are crucial for research aiming to develop effective and efficient interventions. Since lifetime management of

diseases such as asthma, diabetes, and hypertension is highly dependent upon contact with the medical care system, we concentrate on empirical studies examining the processes underlying the use of health care and adherence to lifestyle behaviors and medication for the control of chronic conditions.

Triggers. When we distinguish visits to health care providers that are patient driven from those that are routine annual exams—practitioner or employer scheduled visits—it is no surprise that patient-driven visits are the visits triggered by somatic changes. For example, new symptoms triggered use of care for 100% of 121 elderly individuals whose use of care was tracked over a year; only 30% of their matched controls reported new symptoms (Cameron et al. 1995). The new symptoms reported by the 30% of noncare users were seen as not severe or of sufficient duration to merit attention. Care-seeking delay can be similarly predicted by a lack of perceived relevance of a symptom to illness. Burgess and colleagues (1998) found, for example, that women who delayed care seeking for breast cancer symptoms were more likely to have nonlump symptoms than were those who did not delay care seeking; that is, because there was no lump in the breast, the women who delayed seeking care did not realize the severity of the initial, nonlump symptom.

Heuristics. The numerous empirical studies describing differences in how young and elderly individuals evaluate and respond to their symptoms (see Brody & Kleban 1983, Stoller 1998) make up a vast repository of information with rich theoretical implications for the appraisals that underlie seeking health care. Investigators have begun to identify the specific heuristics, or mental rules, that people use to interpret somatic events and to identify the illness schemata underlying their use (Brownlee et al. 2000). Four classes of heuristics have been identified (Leventhal et al. 2007b): first, heuristics involving innate, spatial-temporal maps of symptoms into

cerebral architecture (e.g., location, duration, severity); second, heuristics involving patterns of symptoms based on prior experience (e.g., schema related—chest pain means a heart problem), novelty (ambiguous or incongruous with underlying schema), trajectory (worsening, fluctuating), and control (e.g., did it or did it not improve with self-care); third, heuristics based upon cultural beliefs and social experience (e.g., age-illness, gender stereotypes, stress/illness, good feeling = good health); and last, heuristics involving active social comparisons (e.g., prevalence and severity in one's community, and similarity rules such as similarity in exposure, temperament, physical characteristics). Heuristics give meaning to somatic changes. For example, changes of long duration and high severity imply that an experienced somatic change may be a serious threat to function and/or life; both are associated with high levels of care seeking among elderly individuals (Mora et al. 2002). Mild, chronic symptoms with unchanging trajectories that lack a specific pattern and are systemic rather than localized are readily attributed to age rather than illness (Brody & Kleban 1983, Prohaska et al. 1987). Since multiple heuristics are involved in the interpretation of a somatic event, it is possible to predict interactions among them. For example, in comparison to symptoms that are distinctive (e.g., patterned or in a specific location, such as sore throats, stuffed nose, or swelling), symptoms that are vague (e.g., in a nonspecific location and/or lacking pattern, such as fatigue or aching body) are readily attributed to life stress and are unlikely to trigger motivation for seeking medical care (Cameron et al. 1995). However, when vague symptoms were experienced in association with life events a month or more in duration, care seeking was just as likely as it was for distinctive symptoms. The perception that vague symptoms may be indicators of illness when associated with stressors of long duration is consistent with empirical data that prolonged stress increases the likelihood of developing a cold after exposure to rhinoviruses

(Cohen et al. 1998, Cohen & Williamson 1991). There are instances, therefore, in which people's mental tool boxes, that is, their heuristics, provide rules in accord with empirical data.

The studies of heuristics suggest at least three directions for future research. First, in their study of delay in care seeking following a myocardial infarction, Bunde & Martin (2006) found opposite effects on delay for mental rules and depression: location (chest pain), pattern (left chest and arm), and novelty (sweating) reduced delay, whereas depression increased delay. Consistent with the parallel-processing assumption that underlies illness cognition models (Leventhal 1970), the effects of heuristics and depression were independent of one another; i.e., the bivariable relationships of depression and/or heuristics to delay were unchanged in multivariable models. The effect of context on the independence or interdependence of heuristics and affect needs to be studied. Second, an individual will act differently when heuristics join potentially unique experiences into a common conceptual framework versus when they do not; e.g., an individual will seek health care if chest pain, sweating, and arm pain are framed within the concept of "heart attack" and not as discrete events. Concepts allow the individual to see similarities over occasions (prior history was related to swift care seeking; Bunde & Martin 2006, Dracup et al. 1995), to see current symptoms as signals for later ones, and to regulate behavior in line with the expectations associated with the more abstract, conceptual framework of "heart attack." By contrast, cardiac diseases such as congestive heart failure lack the features necessary to be coded as coronary events; the chronic symptoms are often mild (breathlessness, fatigue, swollen legs), attributed to age, and are not conceptualized as heart related (Horowitz et al. 2004). Although patients are told they have heart disease, failure to connect their symptoms to a cardiac concept (absence of depth) results in failure to see worsening of chronic symptoms as an indicator that more severe symptoms are on the

horizon. Patients who say they do not understand their conditions do not act to counter, change, and avoid hospitalization. The conditions necessary for linkage to occur, i.e., the time needed to see relationships among embedded experiences, require research.

The third direction for future research in relevant health heuristics concerns the relationship of these illness-oriented heuristics to cognitive-search rules, such as representativeness and availability, which are factors related to limitations in processing capacity (Tversky & Kahneman 1974). Within the illness cognition framework, availability and representativeness are conceptualized as attributes of the domain-specific rules. Thus, the availability and representativeness of a somatic/health heuristic is a function of the schemata or database underlying the search process. Investigations in this domain will be important for understanding the conditions involved in the biases affecting self-appraisals and sustained self-management of chronic conditions.

Schemata and illness representations.

The initial question likely addressed by heuristic processing is, "Am I sick or am I well?" Crossing the threshold from perceiving no illness to perceiving illness involves consideration of alternative schemata on the "sickness" side of the equation. Early multidimensional scaling and cluster analysis of illness labels found four clusters of illness representations in a two-dimensional space: contagious illnesses that are a threat to life and those that are not, and noncontagious illnesses that are a threat to life and those that are not (Bishop 1991). Although scaling did not assess the availability or salience of these categories, Bishop (1991) identified a clear indicator of salience by showing that memory for illness information was better retained if consistent with an underlying prototype. Evidence that prototypes affect behavioral management of chronic conditions was clear in the early studies of hypertension showing that diagnostic labeling was associated with symptom reporting both for patients (Meyer et al. 1985) and

for subjects in laboratory studies (Baumann et al. 1989); the linkage of symptoms to a label reflects the fundamental symmetry between the prototype and experience: “to be sick means being symptomatic.” Patients hospitalized for severe attacks of asthma agreed that they “will have asthma all of their lives” and then agreed that they “have asthma only when they have symptoms” (Halm et al. 2006); behavior was consistent with these beliefs as they took both prevention medication (which is to be used daily when asymptomatic) and controller medication (which is to be used for attacks) only when they were symptomatic. Symptom management is also a pattern for HIV, a contagious, chronic condition; when symptoms clear up, patients with HIV are likely to stop medication (Horne et al. 2004).

The schema most consistent with symptom management is the acute illness model, a schema with five domains identified by the Illness Perception Questionnaire (Weinman et al. 1996): (*a*) identity—symptoms and label, (*b*) time line (time limited), (*c*) cause (external cause), (*d*) consequences (not life threatening), and (*e*) control via self-care or with medical treatment (Diefenbach & Leventhal 1996). The acute representation is linked to procedures for management that alleviate (control) both symptoms and condition (identity), are time limited (time line), nonthreatening (consequences), and work through routes that are plausible given the underlying condition (cause; Horne 2003). The acute or time-limited nature of symptom-focused models is consistent with clinical observations and data showing that patients stop treatment both when symptoms resolve and when objective indicators return to “normal values” (Horne et al. 2004). An excellent study by Henderson et al. (2007) showed that priming an illness schema for the common cold (e.g., by writing about a recent experience with a cold) increases color-naming response time to words related to the common cold in the Stroop color-naming test: Response times to neutral words and words related to cardiovascular disease were unaffected. When a schema for car-

diovascular disease was primed, color-naming response time was affected for words related to cardiovascular disease but not to neutral words or words related to the common cold. Schemata are implicit, organized, and affect behavior when activated.

Representations of treatment and health behaviors.

When a health threat is perceived as imminent or as probable, procedures will be entertained and elaborated for threat avoidance and control (Wakslak et al. 2006). Thus, stimulus events or inputs, such as symptoms, physical dysfunctions, illnesses in others, and a variety of social and media messages, initiate the development of mental representations of the output, or the behavioral side of the control system for the regulation of a chronic illness threat. Treatment behaviors, whether prescribed or self-initiated, carry an implicit set of expectations respecting their consequences, time lines, efficacy (control), and route of action (causal), and these expectations are appraised against both experiential and abstract criteria. For example, patients in the Meyer et al. (1985) study were adherent to medication and in better blood pressure control if they perceived that medication was controlling symptoms they attributed to hypertension; symptoms however, were not related to blood pressure. Jamison (1995) gives numerous examples of the conflict between abstract, verbalized expectations and implicit concrete expectations in the treatment of depression. Although depressed patients have the abstract knowledge, i.e., they “know” it will take several weeks for medication to work, they experience medication symptoms at the onset of treatment without an improvement in mood. Experience overwrites knowledge: They feel the medication is working (creating symptoms) but they also feel it is not working (not improving mood) these feelings often lead to nonadherence. Treatments are embedded in implicit schemata or representations, and a treatment schema is linked to the representation of the illness that is the target for control.

Examinations of treatment beliefs held by chronically ill patients have identified general and specific concerns about medication use (general: doctors overprescribe medication; specific: medication can be addictive) and about specific beliefs respecting its necessity (efficacy for maintaining health) and harmfulness (Horne & Weinman 1999). Endorsement of these beliefs differs across chronic conditions: Necessity of medication is more strongly endorsed by patients with diabetes than by patients with coronary and psychiatric conditions, and concerns about medication are somewhat higher among patients with asthma (Horne & Weinman 1999). Since these beliefs are focused on the response part of the regulatory system, the data show, as would be expected, that these beliefs about treatments are more strongly associated with treatment adherence than are related beliefs about the illness. For example, adherence is better among patients holding strong beliefs about the necessity of their prescribed medication than among patients who are highly concerned about the illness but do not see the medication as necessary (Horne & Weinman 1999, 2002). Medication beliefs were also related to participation in antiretroviral treatment in the Highly Active Antiretroviral Therapy study (Horne 2003, Horne et al. 2004) and to treatment adherence (Horne et al. 2004).

The Theory of Planned Behavior (TPB; Ajzen 1991) has been used to examine the relationships of behavioral and/or treatment beliefs to adherence for issues such as use of condoms (Albarracin et al. 2001), mammography (Tolma et al. 2006), screening for colon-cancer (McCaffery et al. 2003), and dietary and exercise behaviors (see Hagger et al. 2002 and Smith 2004). In the majority of TPB studies, as in several of the studies from the perspective of self-regulation theory, treatment/behavioral beliefs were found to be more strongly related to behavioral intentions and action than to illness beliefs. For example, attendance at a colposcopy clinic for detection of possible cervical dysplasia was predicted by

(a) the belief that one could readily attend, (b) a belief of behavioral control, and (c) intentions to attend. Measures of illness representations did not predict behavior (Orbell et al. 2006). Illness representations did predict attendance as did perceptions of behavioral control and intentions to act when attendance at a colposcopy clinic was differentiated into three categories of patients: did not attend, attended when prompted, and attended without prompting (Orbell et al. 2006, p. 611). Representations of cancer, perceptions of behavioral control, and intentions predicted attendance for patients in need of prompting. Prompting likely primed implicit illness models for these patients.

In their fine study, Orbell and colleagues stated their major goal to be the comparison of "two theories of health behavior": self-regulation and TPB (Orbell et al. 2006). This goal merits comment because the study and others similar to it compare the predictive power of measures, not theories. Moreover, the selection of measures was inappropriate for a comparison of theories. Comparing illness representations as the measure of self-regulation theory to behavioral beliefs and intentions as the measure of TPB is inadvisable because it compares only the first component of the self-regulatory control loop and ignores both treatment representations and outcome expectations, components that are essential for the completion of a self-regulatory loop. A comparison of theories would assess the action stage of the self-regulatory model with the action components of TPB. And if treatment beliefs (TPB) are conceptually the same as treatment representations, then the comparison would be between the two implementations of these components and not the entire theories. In addition, it is arbitrary to include intention in TPB and to exclude it from social-learning or self-regulation theory; intentions are conscious verbalizations of readiness to act; they are at home in any theory that conceptualizes action readiness at implicit and explicit levels. In summary, comparisons among measures are not equivalent to

comparisons among models (Leventhal et al. 2007c).

Coherence between illness and treatment representations; converting schemas into scripts.

The concept of coherence, i.e., whether an individual can make sense of her or his illness experience, was introduced by Antonovsky (1993). The concept influenced other investigators (Moss-Morris et al. 2002) and provided a link between health research and basic research in experimental psychology (Broadbent et al. 2006). Whether a representation of illness and a representation of its possible treatments form a cohesive pattern is a core issue for self-regulation theory. Self-regulation theory would hypothesize that coherence between illness and treatment representations arises when the actions taken to manage an illness are seen as congruent with the treatment representation, that is, that they are perceived to be effective treatments. Perceived effectiveness emerges when the experienced outcome of treatment matches the individual's expectations for both subjective and objective indicators; these indicators or targets are generated from the representation of the illness. The importance of coherence, or "goodness of fit," between illness and treatment representations can be seen in studies of patients with hypertension. For example, patients who believed treatment was necessary (assessed using the Horne necessity scale) were more adherent, and they perceived their hypertension to have a longer time line, more negative consequences, and to be more amenable to control by treatment (Ross et al. 2004); their illness belief that treatment could control their hypertension was coherent with their treatment belief that their hypertension medication was effective. Patients with coherent asthma illness and treatment representations who saw treatment as necessary and who were more adherent represented asthma as a chronic condition. In contrast, patients with noncoherent representations had concerns about treatment, were less adherent, believed asthma to be less controllable, and per-

ceived their symptoms as side effects of treatment (Horne & Weinman 2002). Patients resist treatments that are inconsistent with their illness representations; for example, patients resisted the recommendation to exercise for joint and back pain following myocardial infarction if they perceived excessive activity as the cause of their heart attack (Weinman et al. 2000). Rothman and colleagues (Baldwin et al. 2006) found that maintenance of smoking cessation was related to satisfaction with the change is an alternative way of assessing coherence.

Motivating behavioral change for disease prevention may prove problematic for individuals identified as at genetic risk; behavioral change may seem inappropriate for a disease that is programmed in one's genes. For example, it was expected that testing people at increased risk for familial hypercholesterolemia would increase motivation for medication and diet change among participants with positive test findings, but this was not the case (Marteau et al. 2004). Although the evidence to date is not entirely consistent, there are several indications that people are likely to choose medical treatment over lifestyle change (diet and exercise) for risk reduction when an illnesses is perceived as genetically caused (Marteau et al. 2004, Wright et al. 2006). It is sometimes the case that simple communications can reverse the lack of coherence between representations of illness and treatment; women given a coherent explanation as to how smoking could affect cervical cancer were more likely to undergo cervical screening and express motivation for smoking cessation (Hall et al. 2004). Unpacking the coherence concept suggests that it might be better reframed as converting discrete representations, that of illness and treatment, into behavioral scripts that are generated when behavioral management produces an expected and satisfying outcome, i.e., when behaviors affect objective and subjective criteria as anticipated (Baldwin et al. 2006, Finch et al. 2005, Meyer et al. 1985, Rothman 2000).

Factors Affecting Chronic Illness Management: Contextual Factors of Self, Social Networks, and Culture

Illness and treatment representations are constructed within the perceived self and may lead to revised perceptions of the durability and competence of the physical self and its ability to function in a variety of cognitive tasks and social roles (Epstein 1973). Investigators have focused on two aspects of the self concept that are directly related to the problem-solving process described in the prior section: self-efficacy and beliefs respecting control—both oriented toward the behavioral component of the regulatory system, and optimism and disengagement—two factors affecting the appraisal of movement toward goals. To this point, however, relatively few studies have explicitly examined how feedback from the problem-solving level, that is, feedback from illness management, affects these factors or other aspects of the self system. There also is little empirical data showing how aspects of the self, e.g., self-assessments of health and feelings of vulnerability to specific diseases, affect the construction and content of illnesses and treatment representations.

Self as context. Self-efficacy, or the perception that one is able to perform a specific action in an efficacious manner (Bandura 1989, 2004), and internal control, or the perception of personal control over and responsibility for daily events (Rodin & Langer 1996), are two self system concepts commonly used in health behavior research. Although some studies have treated these variables as traits, they are basically dynamic concepts—beliefs that are shaped by behavior and that in turn affect behavior. It is easier, however, to identify studies that demonstrate how efficacy affects behavior than to identify studies that examine how behavior affects efficacy; for example, studies have looked at the effect of level of self-efficacy on taking medication (e.g., Barclay et al. 2007), for healthy eating (e.g., Shields & Brawley 2006), and for

exercising (e.g., Renner & Schwarzer 2005). To be complete, studies of efficacy should also include how and the conditions under which the behavior affects or mediates changes in self-efficacy (Maibach & Murphy 1995). For example, exercise builds self-efficacy for exercise behaviors if the exerciser experiences positive affect and social support during the activity (e.g., Dechamps et al. 2007). Experiencing positive affect and engaging in social comparison as a result of the behavior elaborates the meaning of the action in cognitive and experiential memory; experience-based positive feedback conveys the value of the behavior to the cognitive system.

Treating self-efficacy as a static trait in research ignores two additional findings in health research in addition to the data showing how efficacy is modified by action. First, self-efficacy may be more important for the initiation than the maintenance of a behavioral change. For example, self-efficacy was important for initiating smoking cessation, but satisfaction with cessation, not efficacy, was related to maintaining cessation (Rothman 2000) (see *Coherence Between Illness and Treatment Representation*, above), and neither self-efficacy nor satisfaction was related to long-term maintenance once non-smoking became habitual (Baldwin et al. 2006). Second, efficacy is domain specific; thus, an individual's self-efficacy for regulating diet is ineffective for regulating exercise (Baldwin et al. 2006). Domain-specific differentiations of self-efficacy have also proven essential to understand the findings and processes involved in rehabilitation following myocardial infarction (Schwarzer & Fuchs 1995), initiation and maintenance of exercise (Sallis et al. 1992), and in regulation of healthy diets (Schwarzer & Fuchs 1995). The differentiation of efficacy across domains and its change over time is consistent with its conceptualization as a dynamic factor rather than as a trait, and it is consistent with the importance of specificity respecting the assessment of affective and cognitive traits.

Investigators have questioned whether efficacy is merely a correlate or is an actual causal mediator of performance—i.e., whether efficacy has a functional relationship to subsequent performance. Heggstad & Kanfer's (2005) studies show that prior behaviors can build efficacy but that the individual's prior behavior and not efficacy has a causal relationship to subsequent behavior. It has yet to be determined whether their findings will hold for maintenance of a health behavior versus only initiation of the health behavior and whether efficacy can affect success for some health behavior changes and not others (Vancouver & Kendall 2006). When efficacy is assessed as an ability to achieve an outcome rather than an ability to perform a specific act or sequence of actions, it might be an indicator of coherence; i.e., as mentioned in the prior section, it might be an indicator that control has been scripted and is on the way to becoming automatic.

In addition to factors such as efficacy that are related to performance skills, other aspects of the self affect motivation for the initiation, cessation, and/or maintenance of healthy and risky behaviors. Three self-appraisals that affect motivation for health behaviors are optimism (Carver et al. 1989), a self-regulation strategy to conserve resources (e.g., not exercising in order to conserve physical energy) (Leventhal & Crouch 1997), and a strategy for goal disengagement (e.g., giving up on an unattainable goal by focusing on a new goal) (Wrosch et al. 2003). For example, Duke et al. (2002) found that community-dwelling older adults who appraised themselves as optimistic were more likely to initiate less vigorous activities (walking) to replace more vigorous activities (jogging) they had given up due to illness a year earlier. These elderly adults were less likely to make replacements, however, if they believed it important to conserve resources. In their examination of strategies for disengagement, Wrosch and colleagues (2003) argue that failing to give up unattainable goals can be a source of emotional distress that will reduce quality of life and have adverse ef-

fects on health. Wrosch et al. theorize that elderly people high on internal control are more likely to experience this syndrome of distress, as well as reduced quality of life and negative effects on their health, because they are more likely to be motivated to reach for goals that are unattainable within their limited remaining life spans. In contrast, elderly people low on control will more readily yield and identify more attainable goals. Interestingly, Wrosch and colleagues (2003) propose that internal control beliefs will be beneficial for giving up and replacing goals among younger persons. Finally, rather than focusing on specific strategies, Heidrich and colleagues (1994) showed that the discrepancy between ideal and perceived self accounted for the effects of cancer and social adjustment; the discrepancy between how the individuals wanted to be and how they saw themselves accounted for, i.e., mediated, their social adjustment and most of the effects of their illness on depression. Although these studies have clear implications for behaviors to prevent and control chronic illness, such as medication adherence, dietary control, and exercise, few provide evidence directly related to these behaviors.

Comment on self studies. It is clear that the perceived and conceptual self (Kihlstrom 1993) and its overall and specific properties (Swann et al. 2007) are intimately related to risk perception and behaviors for the prevention and control of chronic illness. Few studies, however, examine direct connections between factors of the self and the problem-solving processes involved in chronic illness management. For example, heuristics such as novelty (e.g., if a symptom is novel it is more likely to be perceived as serious; Leventhal & Scherer 1987), location (e.g., chest pain is often assumed to indicate heart problems rather than a lung problem, since the chest is most salient as the location of the heart), severity, and timeline are rules for appraising deviation from an underlying, stable image of the bodily self, but little attention has been given to this aspect of self by health

investigators (see Petrie & Weinman 1997 for examples). Self-appraisals such as optimism, conservation of resources, and willingness to yield life goals are coping strategies that lead to the formation of coherent cognitive, emotional, and expressive behavioral scripts by encouraging similar and repeated approaches to life and health problems. The behavioral scripts and expressive behaviors associated with these self-ascribed orientations could affect physical health outcomes through the chronic activation of central autonomic pathways. These issues need to be explored in longitudinal studies that examine behavioral processes at both psychological and physiological levels. A possible approach to conceptualizing one aspect of the process involved in communication between the self and ongoing problem-solving processes would be to set the social comparison process, i.e., whether patients select upward or downward comparisons (Taylor & Lobel 1989), within the context of patient models of disease and treatment: upward when the representations and current evidence suggest the need for acquiring skills and hopeful outcomes, downward when they point to a need to bolster self-esteem. Finally, it is unclear whether person factors, such as optimism or disengagement, are traits and are less usable for predicting intraindividual outcomes or if they are products of domain-specific behavioral episodes that capture both inter- and intraperson effects (Cervone 2004). Person factors generated within specific domains, such as conservation of resources for physical survival, may generalize to other areas at a conceptual level, although instruments for assessment would need to be worded to reflect the content of each domain.

Cultural and social influences on health outcomes. Historians and social scientists alike have been quick to recognize the effects of environmental, cultural, and societal resources on disease and longevity. Braudel's (1979, p. 39) sobering review of the expansion and contraction in European and world popu-

lations illustrates how cycles of expansion and contraction are related to changes in climate, agricultural practices, and expanding trade. Recent data show substantial associations between mortality, aging, and disease and risk indicators with measures of social stratification, e.g., county of residence, income, education, religious involvement, etc. (House et al. 1992, Kaplan 1992). The data highlight the need for further investigation in three areas. First, information is needed as to how specific cultural and socioeconomic factors affect factors at the individual/psychological level. Studies of religion and health provide a more detailed view about how religious participation, spirituality, and a sense of self reduce risky behaviors and encourage healthy behaviors that affect health outcomes (See Schaie et al. 2004). It is not always clear, however, whether or how a particular feature of the ecological context and/or culture, e.g., religious attendance, social engagement, prayer, spirituality, or the body as a temple of God (Hill et al. 2006), affect the specific beliefs and behaviors that affect health outcomes. The association of cultural factors with healthy and risky behaviors could be mediated by common, culturally generated personal traits, social relationships, lifestyles, representations of illness and treatments, and/or approaches to planning for prevention and management of illness and illness risks. Second, when social and cultural analyses identify the specific behavioral factors correlated with disease, there are often ambiguities as to how these behaviors "get under the skin," that is, how they influence the physiological pathways leading to disease and mortality (Taylor et al. 1997). Thus, although associations between disease risk and factors such as ecology, socioeconomic status, and religious involvement identify important areas for research, the data often fail to indicate whether one or some combination of environmental or social factors might be responsible for the increase in disease. The importance of identifying mediators between superordinate factors such as socioeconomic status and disease indicators can be seen by

the changing relationship between a superordinate factor, in this case gender, and lung cancer. Lung cancer rates declined among physician cigarette smokers approximately 20 years after Doll & Hill's (1950) report relating lung cancer to smoking. A similar decline occurred for men in the United States after the 1964 Surgeon General's report (U.S. Dept. Health Human Serv. 1964). Lung cancer rates and prevalence of smoking gradually increased, however, among women during this same period, when marketing campaigns focused on women and the "light cigarette" (Kozlowski et al. 1998). Identifying mediators for these changes, particularly for the failure to observe a decline in smoking among women, is not a simple issue. Depression was thought to be responsible for greater difficulties in smoking cessation among women than among men, but meta-analyses cast doubt on this hypothesis as at least one type of depression, major depressive disorder, neither moderates short- or long-term cessation nor affects gender differences in ease of quitting (Hitsman et al. 2003). Variation across studies in identifying mediators may reflect inadequacies in sample size and the conceptualization and time of assessment of mediating variables. Diary data are beginning to describe the details of social interactions responsible for behavioral and affective factors that may lead to adverse health outcomes (Rook 2003). The task remains, however, to identify the factors that mediated the relationship of social marketing to the social context and role definitions that are involved in the gender differences in initiation and cessation of smoking. As many of the physiological pathways relating smoking to lung cancer have been described, the data succeed in identifying specific factors bridging the social environment and individual behavior to "get under the skin."

Cognitive-behavioral anthropologists (see, e.g., Garro 2000) have described some of the processes involved in the link of culture to health behaviors by assessing whether beliefs about specific illnesses are shared by multiple individuals within a specific

ethnic community. Garro (2000) identified a culturally shared schema or prototype for hypertension and two prototypes for diabetes—one Western in nature, the other specific to ethnic beliefs and practices. Each of the diabetes prototypes identified specific causes and routes for treatment that made sense to individuals and guided their management of diabetes. Narratives of personal history with diabetes meld personal experience with cultural prototypes and reflect the storyteller's degree of belonging to ethnic or Western cultures. Cultural beliefs and their associated use of Western, traditional, and alternative care have been examined in mental health (Cabassa et al. 2007, Karasz et al. 2003), cancer genetic counseling (Eichmeyer et al. 2005), and other conditions (Buchwald et al. 2000). This research was stimulated in part by Pachter's (1994) paper, which alerted medical practitioners to the effects of ethnic disparities in representations of diseases among patients and practitioners that lead to conflict between doctors and patients and ineffective use of medical treatments by patients.

Comments on social factors. The emphasis on the cognitive and affective components of beliefs and the individual acculturation to Western practices is directly relevant to the cognitive processes examined in the construction of illness and treatment representations discussed in the section above on problem solving processes in health and illness, *The Process of Self-Management of Chronic Illness*. It is important, however, not to overlook the role played by institutions in the formation of patient representations of illness and treatment: Culturally established institutions train practitioners in the management of illness, determine the mixture of folk and Western biomedical models involved in the training of practitioners, establish the appearance of the health care system, and establish how care is delivered (Chrisman & Kleinman 1983). Three points related to social factors are worthy of mention for the present review.

First, practitioners have been sensitized to the role of acculturation as a factor in rates of life-threatening chronic illnesses—the causal factors of illnesses such as prostate cancer and obesity ranging from diet and stress in new environments to issues in migration (Jasso et al. 2004). Second, an extensive literature has emerged on the role of linguistic competency (e.g., Ngo-Metzger et al. 2003) and ethnic match of patient and practitioner (e.g., Tarn et al. 2005) in communication and trust in primary care settings. Third, practitioners' questions and procedures in the medical examination reinforce the heuristics patients use in self-appraisal. Asking, "Where does it hurt," "How long has it been going on," and "How does it feel" reinforces heuristics of location, duration, and pattern for self-diagnosis and management. For example, by examining the lungs, legs, and feet (location heuristic) of patients with congestive heart failure, doctors reinforce to the patients that their illness is not related to the heart but instead to respiratory function and circulation in the legs and feet. The detailed analysis of the processes involved in the contacts between patients and practitioners should be helpful for the development of interventions that are both effective and efficient for enhancing patients' understanding and management of chronic conditions.

COGNITIVE-BEHAVIORAL INTERVENTIONS TO IMPROVE SELF-MANAGEMENT

Our review of processes from problem solving through self and social contexts was designed to raise questions and suggest directions for innovative approaches for interventions that will meet criteria for effectiveness and efficiency—i.e., for the development of interventions that are as effective as those in the diabetes prevention trials reviewed above but simpler and less demanding of time and skill by practitioners and patients. Current findings provide both support and doubt as to the feasibility of reaching this dual goal of efficiency and effectiveness. For example, meta-

analyses show that forming intentions and/or plans for action (Leventhal 1970) are effective for crossing the gap between intention to action for simple, one-time behaviors, though generally are ineffective for complex, time-demanding behaviors that prevent and control chronic illnesses (exercise, dietary change; Webb & Sheeran 2006). Moderate levels of success have also been reported for behavioral interventions for the control of chronic illness that are implemented from a social-learning framework (a process approach that is identical in many respects to the problem-solving approach described in the present review) for the control of some chronic conditions. For example, hemoglobin A1c and blood sugar levels for diabetes and blood pressure for hypertension have been successfully controlled through such interventions but symptoms of osteoarthritis or rheumatoid arthritis have not (Chodosh et al. 2005, Lorig et al. 2005). The success of diabetes and hypertension interventions is also balanced by mixed outcomes for congestive heart failure—negative outcomes have been obtained, including failure to prevent recurrent episodes and hospitalization in some sites (DeBusk et al. 2004), but positive outcomes have been obtained in other sites (Sisk et al. 2006).

The successes of social learning interventions indicate that they have captured essential elements needed for improvement of hard outcomes of chronic illnesses (Lorig et al. 1999). Although the interventions are less complex and time demanding than the diabetes trials, their success rates are also less impressive, due perhaps to the generality of the interventions; they are not focused on specific aspects of particular chronic conditions (Wagner 2004). A central theme underlying our review is that increasing the specificity of behavioral management for particular diseases requires the addition of concepts to self-regulation theory generated from observations in the clinic and community, i.e., bidirectional translation. This may entail changes as simple as identifying the invalid subjective cues that patients use to guide

self-management (medication use) and developing behavioral procedures that teach them to ignore subjective targets and use objective indicators (blood pressure and/or blood sugar readings) to guide self-management (Dunbar 2007). Other simple procedures may involve reframing how a behavioral intervention is implemented to insure, for example, that patients see their depressive symptoms as part of their chronic physical illness and not as a separate and unmanageable mental illness. In short, current social learning interventions may not have adequately considered how patients and their medical practitioners represent illnesses and how the treatment experience fits with the patients' representations of their chronic conditions. Once such issues are considered, the effectiveness of the interventions may improve substantially.

Process Theories and Design of Clinical Trials

Investigators have recognized the need to increase the effectiveness and efficiency of behavioral interventions and are proposing new approaches to the analysis and design of clinical trials. For example, Kraemer et al. (2002) have discussed the need for assessments to define subgroups of participants (moderators) prior to the implementation of behavioral interventions and to identify and measure mediators, i.e., factors recorded post intervention that affect treatment adherence. They indicate the need for such analyses in completed multicenter trials and the need for a theoretically based approach to implementation of such measures in ongoing and proposed large-scale trials (Kraemer et al. 2002). These recommendations assume that interventions targeting specific subgroups are potentially more effective and more efficient than interventions using common methods for all participants. Cervone's (2004) analysis suggests the need for extreme caution, however, in expecting measures of traits or *Diagnostic and Statistical Manual of Mental Disorders* (DSM) categories to isolate the within-person fac-

tors that are responsible for the initiation and maintenance of healthy and risky behaviors in specific domains. Assessing factors such as health worry that interact with specific situational triggers (Bem & Funder 1978) would move individual-difference assessment closer to the intraperson or process level by capturing how participants experience and understand health threats and preventive and treatment behaviors. Most clinical trials, however, have selected traits and/or DSM categories as moderators and therefore have not assessed patients' perceptions of their chronic health problems, the psychological accompaniments of these problems, or the procedures they have used or prefer to use for their management. The deficits associated with using interindividual differences as moderators are seen in clinical trials testing whether reducing depressive symptoms would increase treatment adherence in comorbid conditions. The expectation that addressing depression would improve patient care of comorbid conditions seems reasonable because medication adherence has been observed to be poorer in those who are depressed [e.g., aspirin was not taken daily, as prescribed, by patients hospitalized with acute coronary syndrome who scored higher on the Beck Depression Inventory (Gehi et al. 2005)]. The expectation is also reasonable given that decline in depression was associated prospectively with increased adherence (Rieckmann et al. 2006). Interventions to reduce depression have been unsuccessful, however, in improving adherence (Haynes et al. 2005). It is unclear precisely which aspects of patients' physical illness or social and personal contexts elicit and sustain these depressive states or which aspects of patients' affective reactions are responsible for nonadherence. Inconsistent and negative findings of depression interventions may be the result of using measures of interindividual difference rather than intraindividual, self-management processes for matching patients to treatments (Sobell & Sobell 2000). Identification of intraindividual moderators at the level of process rather than trait

calls for sophisticated, content-specific theory and instruments (Cervone et al. 2006, Evans 2006) with sufficient validity to identify and assess these factors at the outset of a clinical trial.

Two alternatives for the development of effective and efficient behavioral interventions that are now being tested are stepwise treatment and self-assignment to treatment. In stepwise treatments, all patients are assigned to the least costly (with regard to time, effort, and negative side effects), highly effective first-step treatment; the second-step treatment is reserved for patients for whom the first step of treatment fails. Second-step treatments are often more tailored to the individual's behavioral or biological system and are often more intensive in terms of time and effort than are first-step treatments. Stepwise approaches to behavioral interventions may have problems less frequently encountered in medication trials. For example, patients in a medical trial may be more likely to attribute failure of a first-step treatment to deficiencies in the medication, whereas patients in behavioral interventions may be likely to attribute failure of a first-step treatment to deficiencies in themselves, a self-attribution that can increase feelings of hopelessness and reduce self-efficacy and motivation for the second-step treatment (Wilson et al. 2000). Improvements in stepwise behavioral treatments will require conditions that prime patients to attribute initial failure to treatment rather than to themselves; this is similar to the goals of treatments for addictions, in which patients demonstrate the "abstinence violation effect" by blaming themselves for losing control over the negative, addictive behavior (Curry et al. 1987).

A direct approach to patient perceptions of illness and treatment is involved in clinical trials in which patients select their preferred treatments; discussion of the conduct and analysis of these trials is under way (see TenHave et al. 2003, Thornett 2001). Assignment to pharmacological- or psychological-behavioral treatments that is inconsistent with

patients' preferences has been shown to have negative effects on the treatment alliance. For example, the perceived treatment alliance improves over time for patients assigned to their preferred psychological treatment but declines if these patients are assigned to a nonpreferred pharmacological treatment (Iacoviello et al. 2007). Consistency with preferences does not seem to affect the alliance for patients who prefer a pharmacological treatment. Because positive alliances are associated with treatment benefits (Martin et al. 2000), treating patients based on their preferences may prove to be important for behavioral interventions for chronic illnesses. It is unknown whether the benefits of consistency in assignment are mediated by the patient's perception of congruity between the representations of the illness and the treatment or from improved communication allowing practitioners and patients to develop shared goals respecting benefits in both subjective experience and objective function. In addition to the above approaches to clinical trial design, Dunn & Bentall (2007) have proposed the use of the instrumental variable method to identify process variables in treatment interventions. These methods are able to assess not only whether an intervention is effective but also are able to examine how it achieves effectiveness. Thus, the method will allow researchers to examine causal processes involved in effective and efficient interventions.

PAST, PRESENT, FUTURE: CONCLUDING COMMENTS

Our view of the status of behavioral research for chronic illness can be summarized as follows. First, changes in behavior can improve health outcomes. The reductions in lung cancer (Ebbert et al. 2003) and breast cancer and the intervention trials for individuals at high risk for diabetes are examples of the effectiveness of behavioral change. Second, to this point in time, interventions focused on changing the behavior of individual patients that have proven effective for

long-term behavioral change are complex and time consuming; they meet the effectiveness criteria for evidence-based practice but are not cost effective or usable in most practice settings. Third, the development of theoretical concepts supported by substantial data show that patients represent specific chronic illnesses and treatments based upon their experience and perception of somatic changes in themselves and observations and exposure to information about illness in others. These exposures affect the behavioral strategies they perceive to be effective and within their competence to perform for the prevention and control of chronic illness. Fourth, the translation of what has been learned about how patients self-regulate health into effective and usable interventions is at beginning stages; interventions work for some diseases, though it is unclear which components are necessary and/or sufficient for success. Finally, investigators are considering approaches to clinical trial design that may make behavioral interventions more usable, i.e., efficient and accessible to the clinical environment, and these innovative approaches ap-

pear to address models of the processes underlying self-management. The integration of self-regulatory models with new approaches to clinical trials is, however, a nontrivial problem because the models suggest that interventions must focus on practitioners and not just on patients. How patients' and practitioners' models affect communication with one another, with family members, and in response to messages from the surrounding culture will determine whether interventions for broad lifestyle changes or for use of specific medications are successful in meeting expectations for changes in objective as well as subjective criteria of benefit. Behavioral interventions of the future may parallel the features of individualized medicine; the former involves treatments matched to specific cognitive-affective patterns of the individual patient, and the latter involves treatments matched to the specific expression of genes underlying the patient's disease. Treatment effectiveness would be evaluated by the accumulation of case-by-case outcomes and, hopefully, the posterior probabilities of success will exceed the prior.

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Contents

Prefatory

- The Evolution of a Cognitive Psychologist: A Journey from Simple Behaviors to Complex Mental Acts
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