

Psychological Factors in Chronic Pain: Evolution and Revolution

Dennis C. Turk
University of Washington School of Medicine

Akiko Okifuji
University of Utah School of Medicine

Research has demonstrated the importance of psychological factors in coping, quality of life, and disability in chronic pain. Furthermore, the contributions of psychology in the effectiveness of treatment of chronic pain patients have received empirical support. The authors describe a biopsychosocial model of chronic pain and provide an update on research implicating the importance of people's appraisals of their symptoms, their ability to self-manage pain and related problems, and their fears about pain and injury that motivate efforts to avoid exacerbation of symptoms and further injury or reinjury. They provide a selected review to illustrate treatment outcome research, methodological issues, practical, and clinical issues to identify promising directions. Although there remain obstacles, there are also opportunities for psychologists to contribute to improved understanding of pain and treatment of people who suffer from chronic pain. The authors conclude by noting that pain has received a tremendous amount of attention culminating in the passage of a law by the U.S. Congress designating the period 2001–2011 as the "The Decade of Pain Control and Research."

During the past decade there has been an explosion of knowledge regarding the underlying neuroanatomical pathways and the neurophysiological mechanisms involved in the complex experience of pain and the contributions of psychosocial factors to the pain experience, patients' responses to nociceptive stimulation, and treatment. As a consequence, there have been significant advances in the development of pharmacological, surgical, neuro-augmentative, and psychological treatment modalities. Indeed, it is reasonable to characterize the research over this period as not only evolutionary but revolutionary. Wide-ranging compendiums, often in excess of 1,000 pages, have been published in an attempt to cover the expansive field of pain (e.g., Loeser, Butler, Chapman, & Turk, 2001; Wall & Melzack, 1999). Many additional volumes more narrowly focusing on the contributions of psychological factors to understanding pain and treating people with pain have appeared (cf. Gatchel & Turk, 1996, 1999; Price, 1999; Turk & Melzack, 2001).

It would be impossible to provide detailed coverage of the wealth of exciting developments that have occurred in the understanding of pain and pain sufferers or to predict the future with confidence. Because of space limitations, we focus on chronic noncancer pain in adults. There are excellent volumes and articles

on pain associated with cancer (e.g., Chochinov & Breitbart, 2000) and developmental issues in pain (Berde & Masek, 1999; Walco & Harkins, 1999). We encourage the interested reader to examine these.

Furthermore, we have narrowed our focus to several areas that we feel are representative of the developments over the past decade and that we believe have promise for the future evolution of understanding of pain, pain sufferers, and treatment. In particular, we provide a status report on research implicating the importance of people's appraisals of their symptoms, their ability to self-manage pain and related problems, and their fears about pain and injury that motivate efforts to avoid exacerbation of symptoms and further injury or reinjury. We provide a selected review of recent treatment outcome research, methodological issues, practical issues (e.g., concerns about both clinical and cost-effectiveness, efficiency of treatment delivery), and clinical issues (e.g., treatment matching, readiness for change, motivation enhancement) to identify promising directions. Issues related to subject attrition, noncompliance, and individual differences in treatment response should be addressed in future studies. We conclude by suggesting future areas of research that we believe will advance the evolutionary process. Even with our targeted focus, we are not able to discuss the topics selected in depth. Moreover, we acknowledge that there are many areas of interest that we are unable to cover. We hope, however, that our discussion will stimulate the reader to explore further the area of pain, as psychologists have made significant contributions.

There has been a growing recognition that pain is a complex perceptual experience influenced by a wide range of psychosocial factors, including emotions, social and environmental context, sociocultural background, the meaning of pain to the person, and beliefs, attitudes, and expectations, as well as biological factors. Pain that persists for months and years, chronic pain, will influence all aspects of a person's functioning: emotional, interpersonal, avocational, and physical. Consequently, successfully treating

Dennis C. Turk, Department of Anesthesiology, University of Washington School of Medicine; Akiko Okifuji, Department of Anesthesiology, University of Utah School of Medicine.

Preparation of this article was supported in part by National Institute of Arthritis and Musculoskeletal and Skin Disorders (NIAMS) Grants AR/AI44724 and AR47298 and National Institute of Child Health and Human Development Grant HD33989, awarded to Dennis C. Turk, and NIAMS Grants AR44230 and AR46303, awarded to Akiko Okifuji.

Correspondence concerning this article should be addressed to Dennis C. Turk, Department of Anesthesiology, University of Washington School of Medicine, Box 356540, Seattle, Washington 98195. E-mail: turkdc@u.washington.edu

chronic pain patients requires attention not only to the organic basis of the symptoms but also to the range of factors that modulate nociception and moderate the pain experience and related disability.

Biopsychosocial Model

Unlike the unidimensional biomedical perspective, which focuses on etiological and pathophysiological explanations for chronic pain, or the psychogenic view, which suggests pain as physical manifestations of psychological difficulties, a biopsychosocial view provides an integrated model that incorporates purely mechanical and physiological processes as well as psychological and social-contextual variables that may cause and perpetuate chronic pain. In contrast to the biomedical model's emphasis on the disease process, a biopsychosocial model views illness as a dynamic and reciprocal interaction between biological, psychological, and sociocultural variables that shapes the person's response to pain (Turk & Flor, 1999). The biological substrate of a disease is known to affect psychological factors (e.g., mood) and the social context within which the person exists (e.g., interpersonal relationships).

Our biopsychosocial model presumes some form of physical pathology or at least physical changes in the muscles, joints, or nerves that generate nociceptive input to the brain. Perception involves the interpretation of nociceptive input and identifies the type of pain (i.e., sharp, burning, punishing). Appraisal involves the meaning that is attributed to the pain and influences subsequent behaviors. These appraisals will be influenced by the beliefs each person develops over his or her lifetime. On the basis of these beliefs and the appraisal process, the person may choose to ignore the pain and continue working, walking, socializing, and engaging in previous levels of activity or may choose to leave work, refrain from all activity, and assume the sick role. In turn, this interpersonal role is shaped by responses from significant others that may promote either the healthy and active response or the sick role. The biopsychosocial model has been instrumental in the development of cognitive-behavioral treatment approaches for chronic pain.

Patient Beliefs

There is a growing body of evidence supporting the importance of patients' beliefs in chronic pain. Beliefs about the meaning of symptoms, the patient's ability to control pain and the impact of pain on his or her life, and worry about the future are just some that have been shown to play a central role in chronic pain. Such beliefs have been found to be associated with psychological functioning (e.g., Jensen, Romano, Turner, Good, & Wald, 1999; Stroud, Thorn, Jensen, & Boothby, 2000), physical functioning (Stroud et al., 2000; Turner, Jensen, & Romano, 2000), coping efforts (Anderson, Dowds, Pelletz, Edwards, & Peeters-Asdourian, 1995), behavioral responses (e.g., Jensen et al., 1999), and response to treatment (e.g., Tota-Faucette, Gil, Williams, Keefe, & Goli, 1993).

Patients' Attribution of Pain Onset

Resting and protecting a painful area following an acute injury is adaptive. However, reliance on the acute model of coping in the

case of chronic pain is often maladaptive. For example, the belief that activity might aggravate the initial injury and thus must be harmful often results in fear of engaging in rehabilitative efforts, leading to preoccupation with bodily symptoms and to physical deconditioning, which can exacerbate pain and maintain disability. Such hypervigilance may predispose patients to attend selectively to somatic perturbations that might otherwise be ignored and to avoid more and more activities that they believe will contribute to further problems (i.e., fear avoidance). This process seems to be particularly problematic for patients whose pain began following an accident. Moreover, a physical trauma may alter the interpretation of physical sensations. People who attribute their symptoms to an injury appear more likely to view any physical sensation as harmful and noxious, thereby increasing anxiety. These changes may, consequently, lower pain thresholds and tolerance, further increase activity avoidance and functional limitations, and facilitate general deconditioning (Turk & Okifuji, 1996).

The importance of attribution of symptom onset can be illustrated with samples of patients diagnosed with fibromyalgia syndrome (FMS; generalized musculoskeletal pain). Several studies have demonstrated that traumatic onset is associated with greater perceived severity of symptoms (Greenfield, Fitzcharles, & Esdaile, 1992) even when there is no difference in physical pathology between those who attribute symptom onset to a traumatic event and those who perceive their symptoms as having an insidious onset (Turk, Okifuji, Starz, & Sinclair 1996). Moreover, patients whose painful symptoms follow an accident have been shown to be more refractory to treatment than patients with nontraumatic onset (DeGood & Kiernan, 1996).

It is important to note that the putative cause of pain onset also influences the mindset of clinicians. Patients who describe their pain as a consequence of accidental injury are significantly more likely to be prescribed physical and pharmacological modalities for symptomatic relief, including nerve blocks, physical therapy, transcutaneous electrical nerve stimulation, and opioid medication (Turk & Okifuji, 1996). Patients who reported symptoms following a trauma were five times more likely to be prescribed opioid medication even though they did not reveal greater physical findings. Thus, health care providers treat patients who report traumatic onset of their symptoms differently, despite the fact that they do not necessarily differ in the extent of detectable physical pathology.

Fear and Harm Avoidance

Because fear is a natural consequence of pain, avoidance of a fear-provoking event is reasonable for acute pain but may serve as an impediment to recovery from chronic pain. In chronic pain, pain-related anxiety and fear may actually accentuate the pain experience (e.g., Crombez, Vlaeyen, Heuts, & Lysens, 1999). Chronic pain patients with elevated pain-related anxiety tend to anticipate higher levels of pain than those with low anxiety, and anticipation of pain often results in poorer behavioral performance (McCracken, Gross, Sorg, & Edmands, 1993).

When people with pain symptoms are exposed to a feared situation (e.g., walking up a flight of stairs), some experience a cascade of avoidance responses, including a cognitive response, worry (McCracken & Gross, 1993); effort to escape and avoid increased pain and exacerbation of injury (Crombez, Vervaeke,

Lysens, Eelen, & Baeyens, 1998; Crombez, Vlaeyen, & Heuts, 1999; Crombez, Vlaeyen, Heuts, & Lysens, 1999; Vlaeyen, Haazen, Schuerman, Kole-Snijders, & van Eck, 1995); and self-reported disability (Crombez, Vlaeyen, Heuts, & Lysens, 1999). Fearful patients appear to attend more to signals of threat and appear to be less able to ignore pain-related information (Crombez et al., 1998).

Waddell and colleagues (1993) reported that fear avoidance of physical activities and work tasks is more strongly associated with disability and work loss during the previous year than are biomedical variables and characteristics of pain. They concluded that "fear of pain and what we do about it is more disabling than the pain itself" (Waddell et al., 1993, p. 164). Several authors (Hildebrandt, Pfingsten, Saur, & Jansen, 1997; Mayer & Gatchel, 1988) have argued that patients with chronic back pain often demonstrate prolonged iatrogenically abetted protectiveness and passivity, largely induced by fear. The result is likely to be a decrease in spinal mobility, muscle strength, and cardiovascular fitness, and ultimately an increase in disability. Klenerman et al. (1995) demonstrated that fear avoidance was one of the most powerful predictors of chronic disability in back pain patients. In fact, Vlaeyen, Kole-Snijders, Boeren, & van Eck (1995) observed that fear of reinjury by activity was a better predictor of self-reported disability than were biomedical signs and symptoms or pain severity.

Furthermore, Vlaeyen and colleagues (Vlaeyen, Haazen, et al., 1995; Vlaeyen, Kole-Snijders, et al., 1995) found a strong association between pain-related fear and increased physiological arousal. Physiological arousal might contribute to maintenance and increase in pain severity (Flor & Turk, 1989). Burns, Wiegner, Derleth, Kiselica, and Pawl (1997) and Vlaeyen et al. (1999) demonstrated that fear-induced increases in lower paraspinal muscle reactivity predicted greater pain during subsequent physical performance tests.

Counterconditioning by means of graded exposure to a feared stimulus is an effective treatment for people suffering from excessive fear (Davey, 1997). Several investigators have demonstrated the effectiveness of exposure-based counterconditioning treatments for secondary prevention of chronicity for people with subacute, work-related back pain (Linton, Bradley, Jensen, Spangfort, & Sundell, 1989). Furthermore, there is preliminary evidence that exposure-based counterconditioning treatment focusing on fear of movement can be effective for patients with chronic back pain (Vlaeyen, Haazen, et al., 1995) and FMS (Vlaeyen et al., 1997).

Finally, McCracken and Gross (1998) reported that reduction in pain-related anxiety predicted improvement in functioning, affective distress, pain, and interference with activity. It appears that fears, pain-related anxiety, and concerns about harm avoidance all play an important role in chronic pain. Thus, it is appropriate to address these factors when treating chronic pain patients.

It is not clear why fear during the acute phase is extinguished for some but becomes a chronic factor for others. One plausible hypothesis is that premorbid individual differences may modulate this process. A good deal of attention has been given to the potential predisposition of negative affectivity and anxiety sensitivity in fear related to pain symptoms (Asmundson, 1999). Negative affectivity, the general tendency to experience subjective distress and dissatisfaction, has been demonstrated to be associated with elevated symptom reporting by chronic pain patients (e.g., Vassend, Krogstad, & Dahl, 1995). Other explanations for the

inability to extinguish fear by some patients include differences in prior learning history and the normal distribution of sensitivity to noxious stimulation. These explanations are not mutually exclusive. The results of future studies may help us to understand better the individual variability observed.

Self-Efficacy

The construct of self-efficacy (SE) has gained a great deal of attention in the pain literature (e.g., Dolce, Doleys, et al., 1986). An SE expectation is defined as a personal conviction that one can successfully perform certain required behaviors in a given situation. Bandura (1977) proposed that given sufficient motivation to engage in a behavior, it is a person's SE beliefs that determine whether that behavior will be initiated, how much effort will be expended, and how long effort will be sustained in the face of obstacles and aversive experiences. From this perspective, coping behaviors are conceptualized as being mediated by people's efficacy beliefs that situational demands do not exceed their coping resources. People with weak efficacy expectancies are less likely to emit coping responses or persist in the presence of obstacles and aversive consequences than those with positive efficacy expectations.

Mastery experiences gained through performance accomplishments are hypothesized to have the greatest impact on establishing and strengthening perceived SE. Thus, techniques that enhance mastery experiences (e.g., graded task accomplishments with both physical and verbal feedback) should be powerful tools for bringing about behavior change. Moreover, the patient's self-attribution of success should facilitate maintenance of improvements. If patients feel that there is little they can do to control their symptoms, they will expend minimal effort in trying to use self-control techniques; conversely, they may become more emotionally distressed, which may amplify symptom perception.

Converging lines of evidence indicate that SE is important in the control of pain (e.g., Lorig, Chastain, Ung, Shoor, & Holman, 1989), adaptive psychological functioning (e.g., Spinhoven, Ter Kuile, Linssen, & Gazendam, 1989), disability (e.g., Lorig et al., 1989), impairment (e.g., Lorig et al., 1989), and treatment outcome (e.g., O'Leary, Shoor, Lorig, & Holman, 1988). For example, SE seems to have some predictive value for the level of performance of physical tasks in back pain patients (Council, Ahern, Follick, & Kline, 1988). Similarly, SE expectancies were found to closely parallel increases in actual exercise levels during treatment (Dolce, Crocker, Moletteire, & Doleys, 1986). Furthermore, posttreatment SE ratings were correlated significantly with reduction in medication use and return to work at follow-up periods ranging from 6 to 12 months (Dolce, Crocker, et al., 1986).

Additionally, patients' anticipation of pain during and following physical tasks seems to interact with SE, collaboratively determining the level of performance. The influence of SE extends to pain reports, depression, and disability in chronic pain patients (Lorig et al., 1989). Furthermore, improvement in SE has been associated with improvement in pain, disability, and mood (Keefe et al., 1997; Smarr et al., 1997).

In short, SE appears to play a particularly important role in perception of and adjustment to pain and subsequent disability. Cioffi (1991) suggested that at least four psychological mechanisms could account for the association between SE and behavioral

outcome: (a) Because perceived SE decreases anxiety and its concomitant physiological arousal, the patient may approach the task with less potentially distressing physical information to begin with; (b) the efficacious person is able to willfully distract attention from potentially threatening physiological sensations; (c) the efficacious person perceives and is distressed by physical sensations but simply persists in the face of them (i.e., displays stoicism); and (d) physical sensations are neither ignored nor necessarily distressing but rather are relatively free to take on a broad distribution of meanings (i.e., change interpretations).

There are several ways in which perceived coping efficacy can contribute to relief from pain. People who believe they can alleviate suffering will likely mobilize whatever ameliorative skills they have learned and will persevere in their efforts. Those who doubt their controlling efficacy are likely to give up readily in the absence of rapid results. A sense of coping efficacy also reduces distressing anticipations that create aversive physiological arousal and bodily tension, which only exacerbate pain sensation and discomfort. Bandura (1977) suggested further that those techniques that enhance mastery experiences the most will be the most powerful tools for bringing about behavior change. He proposed that cognitive variables are the primary determinants of behavior but that these variables are most influenced by performance accomplishments. Thus, SE may play a role in fear avoidance. Exposure to feared activities without the negative consequences anticipated may reduce that fear while at the same time increasing perceived SE. Pain sufferers who avoid activity because of fear of pain, injury, or reinjury will never receive corrective feedback or information that can enhance their sense of SE—that is, the knowledge that they can successfully confront the feared activity without the dire consequences they anticipate.

Psychological Factors Predict Long-Term Disability

Psychological factors have been reported to be predictive of long-term disability for many pain syndromes as well as for pain severity, emotional distress, and treatment seeking (e.g., Boothby, Thorn, Stroud, & Jensen, 1999; Johansson & Lindberg, 2000; Pflingsten, Hildebrandt, Leibing, Franz, & Saur, 1997). For example, in one study, psychosocial variables accounted for 59% of the variance in disability associated with chronic pain (Burton, Tillotson, Main, & Hollis, 1995). When we review studies of predictors of recovery versus continued disability, maladaptive attitudes and beliefs, lack of social support, heightened emotional reactivity, job dissatisfaction, substance abuse, compensation status, and the prevalence of pain behaviors (e.g., Turk, 1997) and psychiatric diagnosis (Gatchel & Epker, 1999) appear to be among the best predictors of the transition from acute injury to chronic disability. It is interesting to note that physical factors, including severity of injury and physical demands of the job, do not appear to contribute as much to the prediction of chronicity.

Linton and Hallden (1997) developed a screening questionnaire that was based on the observations regarding the importance of psychosocial factors as predictors of disability. This instrument has subsequently been adopted as a set of “yellow flags” to be used in conjunction with physical pathology to identify people who have acute, work-related musculoskeletal injuries who might be at risk for long-term disability in New Zealand (Kendall, Linton, & Main, 1997). Recently, Hurley and colleagues (2000) found that re-

sponses on the Linton and Hallden “yellow flags” questionnaire significantly predicted return to work, pain, and functional disability for low back pain patients following active physical therapy.

However, despite these general conclusions about psychosocial predictors of disability, the results must be interpreted cautiously, as there are methodological problems inherent in each study that make generalizations based on the body of research problematic (cf. Turner, Franklin, & Turk, 2000). Particular problems that limit conclusions include reliance on retrospective study, small and unrepresentative samples, use of univariate models, inadequate description of predictor variables and outcomes, and failure to examine important variables.

Clinical Outcomes

Psychological modalities have been used in the treatment of chronic pain patients either on their own or, more typically, as an essential component of comprehensive, multidisciplinary rehabilitation. A large volume of research exists demonstrating the efficacy of the psychological treatments for low back pain (e.g., Goossens et al., 1998; Hildebrandt et al., 1997), FMS (Turk, Okifuji, Sinclair, & Starz, 1998; Turk, Okifuji, Sinclair, & Starz, 1998), noncardiac chest pain (Mayou et al., 1997), arthritis (Lorig, Mazonson, & Holman, 1993), headaches (Holroyd & Lipchik, 1999), temporomandibular disorders (TMD; S. F. Dworkin et al., 1994), and whiplash-associated disorders (Vendrig, Van Akkerveeken, & McWhorter, 2000), to name a few examples. Furthermore, cognitive-behavioral approaches appear to prevent the development of chronic disability due to pain (e.g., Hasenbring, Ulrich, Hartmann, & Soyka, 1999).

In general, psychological treatments for chronic pain are most effective when incorporated with other treatment components or modalities (e.g., physical therapy, education; see, e.g., Bendix, Bendix, Lund, Kirkbak, & Ostenfeld, 1997; Flor, Fydrich, & Turk, 1992). We review several illustrative studies to raise a number of issues that will need to be resolved in future studies (for more extensive discussion, see Morley, Eccleston, & Williams, 1999). Coverage of other pain-related disorders, for example, arthritis and noncardiac chest pain, is included in other articles in this special issue.

FMS

Diffuse pain and hypersensitivity to palpation, accompanied by various functional, physical, and psychological dysfunctions, characterize FMS (Wolfe et al., 1990). Nicassio et al. (1997) compared weekly behavior therapy sessions with patient education. Behavior therapy sessions included education, relaxation, problem solving, and goal setting. Although both groups showed reduction in pain sensitivity, distress, and pain behaviors, the patients in the behavior therapy group achieved significantly greater improvements.

Nielsen, Harth, and Bell (1997) examined the effectiveness of an outpatient program for FMS that included family education along with physical and psychological components. Patients demonstrated significant improvements on measures of pain, interference of symptoms with life, emotional distress, and activity levels following treatment. All but the improvements in activity levels were maintained at 1-year follow-up. No changes, however, were recorded on any objective measure of functional activities. The

discrepancy between results on objective and self-report measures continues to be a concern in the treatment of chronic pain patients that needs to be investigated further (Morley et al., 1999).

Chronic Back Pain

Despite technological advances in medical and surgical treatment, the incidence of low back pain disability continues to escalate (Waddell, 1998). Several recent studies support the efficacy of rehabilitation programs that incorporate psychological interventions for chronic back pain (e.g., Haldorsen, Kronholm, Skouen, & Ursin, 1998; Hasenbring et al., 1999). For example, in a study designed to evaluate psychological treatments in the prevention of chronicity in patients with sciatica, Hasenbring et al. (1999) compared two psychological treatments (biofeedback vs. cognitive-behavioral therapy) for patients at risk for chronicity with usual care and treatment refusers. One of the best predictors of disability was refusal of treatment. Treatment refusers did not differ on any demographic or physical factors from those who entered treatment. These results lend support to the recommendations of many authors (e.g., Waddell, 1998) who believe that efficacy will be enhanced if cognitive-behavioral treatments are initiated earlier in the course of treatment and are scheduled in accordance with individual psychological patterns of coping and readiness for acceptance of self-management (Kerns, Rosenberg, Jamison, Caudill, & Haythornthwaite, 1997; Turk, 1990).

Multidisciplinary Pain Rehabilitation Programs

The large body of evidence demonstrating the importance of psychosocial and behavioral factors in the study and treatment of pain has led to the proliferation of multidisciplinary pain rehabilitation programs (MPRPs) internationally. These MPRPs typically include psychological components with comprehensive treatment plans.

Flor et al. (1992) concluded that MPRPs were more effective than no treatment, a waiting-list control, and monodisciplinary treatments on reduction of health care use and medication, increased activity and return to work, closure of disability claims, and reductions of affective distress. More recently, Morley and colleagues (1999) drew similar conclusions on the basis of their systematic review and meta-analysis of randomized controlled trials, comparing the effectiveness of cognitive-behavioral therapy to waiting-list controls and alternative-treatment control conditions. They found that cognitive-behavioral therapy produced significantly greater changes in pain experience and cognitive coping and that it reduced behavioral expressions of pain. Significant differences were not found, however, for dysphoric mood, negative appraisals, and social role functioning. The failure to find significant improvement in affective distress by Morley et al. is at variance with the report of Flor et al. The explanation for this inconsistency is unclear, and the issue warrants further investigation.

MPRPs are often referred to as being based on operant, behavioral, or cognitive-behavioral principles. The actual treatments are broadly defined and often include diverse ingredients. It is difficult to determine what the active components of the treatment packages actually are. This is important because (a) it is not cost-effective to provide comprehensive treatments with multiple components,

some of which may be unnecessary, and (b) patients with different characteristics may benefit from different treatments, and not all of the components included may be necessary for all patients (Kole-Snijders et al., 1999; Turk, 1990).

Goossens et al. (1998) evaluated the additive effects of the cognitive and relaxation components to a rehabilitation program for chronic pain patients based on operant principles. The usual cost for the operant-alone program averaged \$8,795. This cost was compared with the combined operant and cognitive-relaxation treatment, which cost \$9,196. Thus, the additional cognitive and relaxation components contributed a cost of \$401 for each patient. This additional expenditure did not significantly improve the already very positive outcome of the operant treatment. We must be cautious in this interpretation, however, because 43% of the operant-alone group was unavailable at follow-up. Moreover, the authors noted that only a small number of patients in the cognitive-relaxation group complied with the assignments for home practice, and thus, the treatment may not have been given an appropriate trial (Turk, Rudy, & Sorkin, 1993).

The studies included in the meta-analyses published by Flor et al. (1992) and Morley et al. (1999) support the effectiveness of including a psychological component within a rehabilitation program. The cost figures from a study reported by Bendix et al. (1997) illustrate the importance of going beyond statistical significance to examine the cost-effectiveness, as this may lead to different interpretation of the comparative outcomes. Because their study shows that the efficacy of the program including a psychological intervention did not differ from the efficacy of the exercise-alone program, one could conclude that the psychological module did not add therapeutic benefit significantly. This conclusion, however, needs to be tempered by the fact that there was a 20% attrition from the program with no psychological component compared with an 8% patient dropout from the program with psychological components. Because the costs of the two shorter treatment programs were equivalent, the better patient acceptance, as evident by the lower attrition rate, favors the inclusion of the psychological treatment. Additional research is needed to examine the interaction of inclusion of a psychological component and continuation within rehabilitation treatment programs.

Systematic examination of outcomes related to cost-effectiveness of MPRPs that include psychological components as core ingredients indicates that these interventions are more efficient than alternatives such as surgery, implantable devices, and long-term opioid therapy. We (Turk & Okifuji, 1998) demonstrated the cost-effectiveness of MPRPs by calculating differences in pain medication, health care use, and disability payments. We then compared the outcomes of these financial parameters with the most frequently used alternative treatments. Overall, we determined that MPRPs were up to 21 times more cost-effective than alternatives such as surgery.

What Works for Whom?

Although psychological treatments appear to be important components of rehabilitation treatments for chronic pain patients, not all patients benefit equally. Focusing solely on group effects may mask important issues related to the characteristics of patients who successfully respond to a treatment. Chronic pain syndromes are made up of heterogeneous groups of people even if they have the identical medical diagnosis. A common pitfall in clinical research

and practice is the assumption of patient homogeneity. Inclusion of a diverse group of patients into the same category simply because they present a common set of symptoms may result in inconsistent research results, as commonly observed in the pain literature. Several efforts have been made to identify groups of patients who differ on important variables and to evaluate differential treatment responses.

A significant problem with rehabilitation-oriented treatments is that (a) a large number of patients refuse treatment offered, (b) a large number of patients drop out of treatment, and (c) the rates of relapse are relatively high (Richmond & Carmody, 1999; Turk & Rudy, 1990a). One of the problems is the prevalent assumption regarding delivery of medical care. Conventionally, patients present problems, and health care providers evaluate and apply a solution (treatment). In this model, patients are passive recipients of the intervention. However, rehabilitation approaches generally require patients to *do* things; active engagement and performance of tasks and exercises are critical in this approach. Despite patients' active participation, these programs may not necessarily eliminate pain.

The main objective of rehabilitation programs is to help patients assume responsibility for self-management of their condition. The programs do this by directing treatment toward fostering self-management and self-efficacy, including both physical (e.g., exercises, pacing, and body mechanics) and psychological approaches. Rehabilitation programs require patients to make a number of lifestyle changes including regular performance of physical exercises, practice and use of various coping strategies, and communicating differently. Research on programs for other lifestyle changes, such as weight loss, smoking cessation, and substance abuse, has shown that patients experience significant relapse following initially successful outcomes. Thus, it is not surprising that the relapse rates are high for those pain patients who complete rehabilitation. Efforts to identify those prone to treatment rejection, dropout, and relapse would be useful as they could guide attempts to prepare patients for treatment and to structure treatments to meet important characteristics of patients that may promote positive outcomes.

Readiness to Change

Patients' own beliefs and expectations concerning how their pain should be treated appear to have an important influence on treatment outcome. Patients who did not initially agree with the self-management approach reported greater pain and tended to be less satisfied with the treatment (Shutty, DeGood, & Tuttle, 1990). Identification of the pretreatment beliefs that may interfere with treatment would permit targeting of information to modify these beliefs prior to formal treatment to increase acceptance and within the treatment to facilitate remaining in treatment and adherence to the self-management exercises.

Kerns and colleagues (1997) proposed that people experiencing chronic pain vary in readiness to accept and adopt a self-management approach to manage their pain and associated problems. According to this readiness-for-change model, some people who believe strongly that their pain is "medical," requiring physical treatment, are not likely to accept a self-management approach. Others may acknowledge that medical interventions are limited and may be more willing to accept a self-management treatment.

Kerns et al. (1997) developed the Pain Stages of Change Questionnaire (PSOCQ) to assess patients' readiness to adopt a self-management approach to chronic pain. On the basis of their response to the PSOCQ, patients' readiness can be classified as one of the following stages: precontemplation, contemplation, action, or maintenance. Several investigators (Biller, Arnstein, Caudill, Federman, & Guberman, 2000; Kerns & Rosenberg, 2000) demonstrated that specific stage of change of patients was associated with completion of a self-management treatment program, suggesting that the concept of readiness for treatment may identify patients at risk of prematurely terminating their treatment.

Discussion continues, however, on whether the transtheoretical model (Prochaska & DiClemente, 1998), originally developed for conceptualizing stages of readiness to stop smoking (on which the PSOCQ is based), is appropriate for chronic pain patients (e.g., Jensen, Nielson, Romano, Hill, & Turner, 2000; Keefe et al., 2000). Jensen and colleagues found that patients in the action and maintenance phases did not differ and that none of the groups differed from the others significantly on the precontemplation scale, leaving some question as to the ability of the PSOCQ to classify patients into distinct groups. Although readiness for change makes intuitive sense, there may be some limitation to the measure being used to classify patients into discrete stages. Similarly, Biller et al. (2000) cautioned against using scores on the PSOCQ as a basis for withholding treatment. Rather, clinicians might develop methods to match preparatory information to patients' readiness to adopt a self-management approach (Jensen, 1996; Keefe et al., 2000).

It is interesting to note that the stages of change did not predict treatment outcome in one study (Kerns & Rosenberg, 2000). This may be because the cognitive-behavioral components of treatment were designed to help patients reconceptualize their views of their problems and their ability to exert control. Thus, modification of patients' readiness to adopt greater responsibility for pain management is a target in these programs. These findings suggest that increased commitment to a self-management approach may serve as a mediator or moderator of successful treatment.

Identification of Patient Subgroups

A number of studies have identified subgroups of patients according to psychosocial and behavioral characteristics (e.g., Johansson & Lindberg, 2000; Mikail, Henderson, & Tascia, 1994; Turk & Rudy, 1988, 1990b; Turk, Sist, et al., 1998). Several studies (Dahlstrom, Widmark, & Carlsson, 1997; Epker & Gatchel, 2000; Rudy, Turk, Kubinski, & Zaki, 1995) found that patients classified into different subgroups on the basis of their psychosocial and behavioral responses responded differentially to identical treatments. Subgroups of chronic pain patients characterized by a number of psychosocial and behavioral characteristics seem to be fairly consistently observed across different pain syndromes (e.g., cancer, FMS, TMD, headaches, low back pain; Turk & Rudy, 1990b; Turk, Sist, et al., 1998), suggesting the independence of psychosocial factors from the physical pathology. A number of investigators (e.g., S. F. Dworkin & LeResche, 1992; Turk, 1990) recommend the use of a dual-diagnostic system: a biomedical diagnosis and a psychosocial diagnosis. Distinctiveness of the psychosocial profiling implies that patients in different subgroups may exhibit differential responses to a treatment. In-

deed, this has been demonstrated in several outcome studies. For example, one of the most frequently used pain inventories, the Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985; Piotrowski, 1998), yields a three-subgroup solution. The MPI subgroups were initially developed using the cluster-analytic approach. Turk and Rudy (1988) labeled one subgroup characterized by severe pain, compromised life activities and enjoyment, reduced sense of control, and high level of emotional distress as "dysfunctional." Another subgroup, also marked with relatively high degrees of pain and affective distress but further characterized by low levels of perceived support from significant others, was labeled "interpersonally distressed." The third subgroup consisted of chronic pain patients who appeared to be coping relatively well despite their long-standing pain. This group, which experienced low levels of pain, functional limitations, and emotional distress, was labeled "adaptive copers." The subgroups have been replicated and validated in numerous studies (e.g., Jamison, Rudy, Penzien, & Mosley, 1994).

Potential for Treatment Matching

Studies comparing the MPI subgroups have yielded evidence supporting differential response to the same intervention (e.g., Dahlstrom et al., 1997; Epker & Gatchel, 2000; Rudy et al., 1995). For example, when a treatment consisting of an intraoral appliance, biofeedback, and stress management for TMD patients was tested, the dysfunctional group showed significantly greater improvements on measures of pain intensity, perceived impact of symptoms on their lives, and depression relative to the interpersonally distressed and adaptive copers groups (Rudy et al., 1995).

Comparable results were reported with a rehabilitation pain management program for FMS patients (Turk, Okifuji, Sinclair, & Starz, 1998). In this study, the patients in the dysfunctional group improved in most areas, whereas the interpersonally distressed patients, who reported levels of pain and disability comparable to the dysfunctional group, failed to respond to the treatment. There was little change in the adaptive copers patients, owing possibly to a floor effect. The results further support the need for different treatments targeting characteristics of subgroups and suggest that psychosocial characteristics of FMS patients are important predictors of treatment responses and may be used to customize treatment. For example, whereas the interpersonally distressed patients may require additional treatment components addressing clinical needs specific to this group (e.g., interpersonal skills), some components of the standard interdisciplinary treatment may not be essential for the adaptive copers patients.

The results described implicate the importance of matching patients' characteristics to treatment. It is unfortunately all too common to treat chronic pain patients with a "one-size-fits-all" intervention. By specifically addressing patients' psychological needs, clinicians are likely to be able to enhance both the cost-effectiveness and the clinical effectiveness of interventions. Moreover, early identification of patients' modes of adapting to subacute pain may lead to the development of interventions that can prevent chronicity and long-term disability (Gatchel & Epker, 1999; Johansson & Lindberg, 2000).

Compliance and Adherence

For a treatment to be effective, the patient must comply with the treatment recommendation (Turk et al., 1993). Unfortunately, the extent to which patient compliance influences treatment outcomes is not well understood because treatment outcome studies rarely assess patients' compliance with recommendations (Epstein, 1984). This is a particular problem, because failure to assess patient compliance may lead to a conclusion that a treatment is not effective when the treatment may not have been given an adequate trial. To understand this point, consider a study conducted by Basler and Rehfisch (1991) in which they evaluated the effectiveness of a cognitive-behavioral therapy for patients with rheumatic pain. The initial results of this study suggested that the treatment did not produce a significant benefit. When patients were divided into those who had complied with the recommendations and those who had not, however, the compliant patients demonstrated significant improvements whereas the noncompliant patients did not. Thus, because lack of compliance tends to severely undermine the overall effects of the therapy, failure to attend to the issue of compliance may lead to an erroneous conclusion about the efficacy of the intervention. One must be cautious in interpreting treatment outcome differences between compliant and noncompliant patients, however, as these groups may not be comparable and may differ on other important variables that might be associated with better outcomes (e.g., good social support). Nevertheless, there is no question that compliance and adherence will continue to be important areas to be studied if the maintenance of treatment outcome is to improve.

Future Directions

We have attempted to provide an overview of areas that contribute to our understanding of the person with chronic pain and psychological variables that have implications for improvements in treatment. We noted that clinical outcomes tend to support addressing cognitive, affective, and behavioral contributors to the experience of and response to chronic pain. We now consider future directions beyond what we have already suggested.

Integration of Physical, Psychosocial, and Behavioral Parameters

One of the major emphases of psychological research on pain is delineation of the relationship between psychological and physiological parameters. A number of investigators have described models that attempt to integrate physiological, psychophysiological, psychological, and behavioral factors to explain symptoms, perception of pain, disability, and response to treatment (e.g., Price, 1999; Turk & Flor, 1999). Technological advancements in the recent decades in medicine, such as functional magnetic resonance imaging and positron emission tomography, permit researchers to examine brain activity noninvasively (e.g., Rainville, Duncan, Price, Carrier, & Bushnell, 1997). Psychological research needs to take advantage of such technology to better understand the effects of psychological factors on brain structures. Greater understanding of the reciprocal interactions among neurological, hormonal, endocrine, and psychological factors should advance our understanding and ability to treat pain more effectively.

Investigators need to address such questions as the following: How are the anatomy of the nervous system and physiological processes altered by psychological interventions? How do physiological processes and physical status affect mood, thoughts, and behavior? What is the role of genetic predispositions on pain perception and response? How are memories organized, stored, and retrieved so that they influence the pain experience? Development of a truly revolutionary, unified model awaits the answers to these and numerous other questions.

Overgeneralization Based on Pain Clinic Samples

Minimal attention has been given to those people who recover spontaneously or who make adequate and often exceptional accommodations to their conditions regardless of physical impairments and limitations. Much of what is known about chronic pain syndromes is based on people who seek treatment. These individuals are not a representative group (cf. Bradley et al., 1994). It is likely that people will seek treatment when they have an exacerbation of their symptoms. As a result, almost any treatment will appear reasonably successful. Thus, one must be cognizant of the potential impact of *regression to the mean* when evaluating outcome studies based on treatment seekers. It is essential that research extend beyond the clinical population to community samples that are not seeking care.

People with different pain syndromes have prior learning histories that preceded the onset of their symptoms. One must consider the relevance of antecedent factors and not focus exclusively on patients at one point in time, the point of symptom onset or at which they seek treatment. On the flip side, however, one should keep in mind that when patients who have had symptoms for many years are asked to recall features of their lives prior to symptom onset, they may produce invalid information (i.e., demonstrate a retrospective bias). People seek post hoc rationales and causal factors to explain their current situation. Thus, patients' recollections may lack complete veracity, not because of conscious deception but because of the cognitive heuristics used (Turk & Salovey, 1986) and the influences of memory. One must resist the temptation to make inferences about causality from correlational data and retrospective interpretations.

The Transition From Acute to Chronic Pain: Secondary Prevention

The vast majority of people who are injured recover in a reasonable amount of time and do not develop chronic disorders. Similarly, a significant number of people who develop chronic diseases associated with pain do not become physically and emotionally disabled. As noted, a number of efforts have been made to identify the predictors of disability among these groups (e.g., Gatchel & Epker, 1999; Johansson & Lindberg, 2000; Linton & Hallden, 1997). There are, however, few longitudinal studies, and replications are the exception rather than the rule (Turner, Franklin, & Turk, 2000).

As we noted, a number of studies have begun to identify predictors of disability for injured workers with acute pain states and also predictors of response to treatment. But identifying predictors is insufficient. The next step is to determine whether knowledge of predictors can guide treatment design and the de-

velopment of strategies for improving outcome. To paraphrase the old behavioral adage, "Insight without changing behavior is a waste of time."

Prevention and earlier interventions hold promise for reduction in the extent of disability. The average person treated at a multidisciplinary pain center averages over 85 months of pain (Flor et al., 1992). By this time, patients have become so disabled that rehabilitation becomes a Herculean task; the outcomes, although reasonably good, could have been improved if implemented at an earlier stage. Von Korff and colleagues (Moore, Von Korff, Cherkin, Saunders, & Lorig, 2000; Von Korff et al., 1998) described an early intervention program that was implemented in primary care. This program focuses on patient education and efforts to enhance patients' SE. Linton and Bradley (1996) have reviewed a number of efforts that may be viewed as secondary prevention, that is, treatments used with those who have already had a first pain episode and designed to prevent long-term disability.

Given the natural history of many musculoskeletal pain disorders, it is important that early interventions be reasonably inexpensive. For example, experience with back pain suggests that a significant percentage of people will recover in only a few weeks. Providing expensive interventions for groups with high rates of natural recovery is inefficient and costly. Von Korff (1999) reminded us that for a number of patients, pain will persist or recur, although they are able to return to work in a short time. Efforts to prevent, or at least minimize, the consequences of exacerbations and relapse may be particularly cost-effective. The effects of early interventions are mixed, but the costs of chronicity are so extreme that research in this area is definitely warranted.

Prospective and Process Research

The majority of the research in the field of pain has been cross-sectional. Little is known about the evolution and changes that accompany pain conditions over time, as well as throughout the process of treatment. Prospective studies with high-risk populations, such as those preparing for amputation and herpes zoster patients who are at risk for development of postherpetic neuralgia (R. H. Dworkin et al., 1992), may be able to tell us a great deal about the changing pain experience, adaptation, and disability. These disorders offer the opportunity to study the evolution of the adaptive processes.

Process research is important not only for observing the evolution of chronic pain syndromes but also for learning about the co-occurrence of physical and psychological factors over time. That is to say, rather than relying on retrospective reports, it will be useful to investigate the co-occurrences of thoughts, feelings, and behaviors over time. This process approach can also provide useful information about the manner in which changes occur during treatment. For example, what are the relationships between physical and psychological changes during the course of a treatment such as biofeedback? Do autonomic parameters change first, influencing symptoms, mood, thoughts, and behavior, or does mood change first, leading to a different interpretation of symptoms and a subsequent alteration of physiological responses?

Advances in computer and telecommunication technology have led to interesting innovations for process research. Studies have begun to identify the relationships among thoughts, feelings, and behavior in "real time" and permit careful assessment of the lagged

effects of cognition, mood, activity, and so forth on subsequent symptoms (e.g., Affleck et al., 1999; Stone, Broderick, Porter, & Kaell, 1997). The applications of these technologies should permit greater understanding of the interactive effects among these important variables while eliminating the potential problems and biases inherent in retrospective recall.

Patient Differences and Treatment Matching

There seems no question that psychological and behavioral factors play a central role in pain perception, experience, and response. Many avenues of research still need to be pursued to reveal the mechanisms by which these factors produce their effects on physiological processes and behavior. As we noted, preliminary studies have demonstrated that groups of patients may differ in psychosocial and behavioral characteristics and may respond differentially to the same treatment, even when the medical diagnosis is identical (Turk, Okifuji, Sinclair, & Starz, 1998; Turk & Rudy, 1990b).

Blanchard (1979) pointed out six important dimensions that should be considered in evaluating clinical applications. These dimensions would similarly hold true for the evaluation of pain management procedures and for the issues that we raised above. They include (a) the proportion of the treated patient sample that demonstrated significant therapeutic improvement, (b) the clinical meaningfulness of the therapeutic changes that were obtained, (c) the degree of transfer of changes that were obtained in the clinical setting to the patient's natural environment, (d) the degree of change in the biopsychosocial response for which the treatment was prescribed, (e) the replicability of the results by different clinicians and clinical sites, and (f) the extent and thoroughness of the follow-up data obtained. Each of these is an important factor that should be considered when evaluating the therapeutic efficacy of any pain management intervention.

As we noted, similar patterns of psychosocial disability are associated with common diseases and syndromes in which chronic pain is an important clinical feature. Careful reading of discussions of treatment of patients with different pain syndromes reveals that all share features from the psychosocial domain—depression, limitations in activities, and increased health care use—while each retains those unique physical features from the biological or physical domain related to the specific body site (e.g., head, jaw, back) or pathophysiological processes (e.g., postherpetic neuralgia, cancer). Research that includes multiple pain disorders may be useful. Researchers should be less parochial in focusing their investigations on only one preferred syndrome (e.g., FMS, back pain, TMD) with the assumption that it is uniquely different from others. Actually, those who suffer from different conditions may have more in common with each other than those with the same diagnoses (Turk, 1990).

Research on Motivation for and Adherence to Treatment

Patients' beliefs about their pain appear to play an important role in adjustment to chronic pain. Moreover these beliefs have been associated with compliance with treatment recommendations, improvement in depressive symptoms, and increases in physical functioning and health care use (Flor & Turk, 1988; Jensen, Turner, Romano, & Lawler, 1994). Thus, patients' beliefs need to

be addressed more systematically in clinical trials and to become targets of research (Turk & Rudy, 1991). Not all patients are equally ready for treatment (Kerns et al., 1997). Assessment methods need to be refined to help identify impediments to treatment responsiveness. Intervention strategies that can be used to enhance motivation and receptiveness should be investigated (Jensen, 1996). Finally, the emphasis or components of treatment need to be individualized to address specific maladaptive beliefs or to reinforce more appropriate ones.

The many areas of behavior change indicate that the risk of relapse is high. Treatment for people with recurrent pain and chronic pain often makes major demands for lifestyle changes: relaxing, pacing activities, communicating more effectively, performing exercises, and so forth. If one knows that relapse is high for such behavior changes as reduction or elimination of substance use and weight reduction, why would one be surprised that relapse would be high for people with persistent and recurrent pain? Almost all psychological interventions for persistent pain have been shown to be effective, at least for some people, but the duration of the benefits varies. Strategies need to be investigated to enhance maintenance of therapeutic gains.

Indeed, Marlatt and Gordon (1981) developed a relapse-prevention model to address the problem of long-term maintenance of new health behaviors. It was created to aid patients to acquire new coping skills that would reduce the risks of an initial relapse or recurrence and to prevent minor lapses from escalating into total relapse. The major element of the model is that the problem of possible lapses and relapses is neither ignored nor attributed to failures of the treatment management program or the patient. Such lapses and relapses are viewed as an important part of the learning required for long-term successful behavioral change and thus should be included in pain rehabilitation programs (cf. Keefe & Van Horn, 1993).

As clinicians, we also need to go beyond the assumption that people who have problems coping with their pain suffer from a skills deficiency and that simply teaching them appropriate skills will alleviate their problems. Beyond consideration of the skills deficiency, we need to consider production deficiency. That is, what are the impediments to the use of the skills in the natural environment and what can we do to help patients overcome these obstacles?

Closely aligned with maintenance is compliance. All too often, we seem to be concerned about the details of the treatment but less about whether our patients adhere to the demands of the treatment. Clinicians make recommendations for significant changes in behaviors and expect that their patients will continue to engage in the behaviors prescribed. We have been rather naive in this expectation (hope, wish, or prayer); in fact, the long-term rate of adherence by chronic pain patients has been reported to be quite low in some studies (Lutz, Silbret, & Olshan, 1983). Greater attention needs to be given to adherence enhancement methods (Turk & Rudy, 1991). We must make sure that we assess adherence in our outcome studies.

Clinicians may view a treatment as ineffective when it may, in fact, have been very effective but only for those who complied with the prescriptive behaviors. If people do not practice the exercises included within the treatment, why would we be surprised if they do not show positive outcomes? Here the poor results are due not to an inefficacious treatment but rather to the failure of

patients to adhere to the treatment recommendations. Again, we see the importance of looking not just at the effectiveness of the treatment for a group but at the characteristics of patients who improve as opposed to the characteristics of those who do not.

Chronic Pain Should Be Treated Like Other Chronic Diseases

We noted earlier that patients with chronic pain seeking treatment at MPRPs have had symptoms for an average of 7 years (Flor et al., 1992). Even when successful, pain rehabilitation does not cure pain but emphasizes self-control and self-management of symptoms. This observation is not unique to MPRPs; the majority of people who have surgery or have spinal cord stimulators or drug delivery systems implanted continue to report substantial pain (Turk & Okifuji, 1998). Examination of the results of long-term opioid therapy also reveals significant residual pain. If we view chronic pain as a chronic disease like diabetes or hypertension, then our approach to treatment may be misguided. Why would we expect that people with long-term problems, for whom there is no cure and who have a continuation of symptoms, would be able to return to normal function following treatment? Even successful treatment requires people with chronic pain to continue to make significant lifestyle changes and engage in self-management techniques. Because these pain sufferers are not cured, they require regular care and follow-up. Would we expect a diabetic to come for time-limited treatment and then be sent off on his or her own with no continuous care?

We have tended to view chronic pain more as an acute condition that will resolve following treatment, but this is patently not the case. If we view chronic pain as a lifelong disease, then, as with other chronic diseases, we should expect treatment to be ongoing, requiring regular checkup and continuing care.

From the chronic disease perspective, then, treatment is not over after a few sessions or a 3–4-week rehabilitation program. Maintenance becomes an essential component. As such, we should expect and plan for the need to include booster sessions (Bendix, Bendix, Hastrup, & Busch, 1998; Laney et al., 1995). We need to give attention to the development and evaluation of treatments of pain as a chronic disease that is not cured but requires maintenance-enhancement strategies.

Of course, there are many other research questions and directions that we could describe. What we have attempted to do is to highlight some of what appear to be the most prominent. We have come a long way since the mechanistic, Cartesian dualistic model of pain that was so prominent prior to the 1960s. There have been major strides in understanding the complexity of pain and the important roles of psychosocial and behavioral, as well as physical, factors in the experience of pain. We can look ahead to new challenges and opportunities that await us. Research will help us better understand pain, prevent disability, and treat the diverse conditions that come under the generic rubric *chronic pain*. We expect that the revolution created and led largely by psychologists in the 1960s was only a beginning point that initiated an evolving process. The evolution will require continuing efforts if we hope to better understand pain, to prevent disability, and to provide optimal (clinical and cost-effective) treatments.

In conclusion, psychologists and psychological principles have played a major role in current understanding and treatment of people with pain. A plethora of psychological factors have been demon-

strated to play important roles in the transition from acute to chronic pain, disability, adaptation, and response to treatments. The importance of psychologists in the assessment and treatment of chronic pain has been accepted by a number of agencies and governmental bodies in the United States, Canada, and England (e.g., U.S. Veterans Administration, U.S. Social Security Administration, Ontario Workplace Safety and Insurance Board). The Commission on the Accreditation of Rehabilitation Facilities (CARF) requires involvement of psychologists in treatment for a program to be certified. The National Institutes of Health Technology Assessment Panel (1996) and the American Psychological Association Division of Clinical Psychology's Task Force on the Promotion and Dissemination of Psychological Procedures have endorsed cognitive-behavioral therapy as a "well-established" treatment approach for several pain problems (e.g., rheumatoid arthritis; Chambless et al., 1998).

We have described some of the representative literature and pointed out a number of areas in which research is likely to evolve over the next decade, designated by the U.S. Congress as the "The Decade of Pain Control and Research." There are many exciting topics that, because of space limitations, we could not discuss. We were able to give only cursory attention even to research we selected for examination. We cannot predict the future; however, the prospects for the better understanding and treatment of people with chronic pain are inevitable. We are confident that the evolution and, indeed, the revolution will continue.

References

- Affleck, G., Tennen, H., Keefe, F. J., Lefebvre, J. C., Kashikar-Zuck, S., Wright, K., et al. (1999). Everyday life with osteoarthritis and rheumatoid arthritis: Independent effects of disease and gender on daily pain, mood, and coping. *Pain, 83*, 601–609.
- Anderson, K. O., Dowds, B. N., Pelletz, R. E., Edwards, W. T., & Peeters-Asdourian, C. (1995). Development and initial validation of a scale to measure self-efficacy beliefs in patients with chronic pain. *Pain, 63*, 77–84.
- Asmundson, G. J. G. (1999). Anxiety sensitivity and chronic pain: Empirical findings, clinical implications, and future directions. In S. Taylor (Ed.), *Anxiety sensitivity, theory, research and treatment of the fear of anxiety* (pp. 269–286). Mahwah, NJ: Erlbaum.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191–215.
- Basler, H. D., & Rehfisch, H. (1991). Cognitive-behavioral therapy in patients with ankylosing spondylitis in a German self-help organization. *Journal of Psychosomatic Research, 35*, 345–354.
- Bendix, A. F., Bendix, T., Hastrup, C., & Busch, E. (1998). A prospective, randomized 5-year follow-up study of functional restoration in chronic low back pain patients. *European Spine Journal, 7*, 111–119.
- Bendix, A. F., Bendix, T., Lund, C., Kirkbak, S., & Ostenfeld, S. (1997). Comparison of three intensive programs for chronic low back pain patients: A prospective, randomized, observer-blinded study with one-year follow-up. *Scandinavian Journal of Rehabilitation Medicine, 29*, 818–819.
- Berde, C. B., & Masek, B. (1999). Pain in children. In P. D. Wall & R. Melzack (Eds.), *Textbook of pain* (4th ed., pp. 1463–1478). New York: Churchill-Livingstone.
- Billor, N., Arnstein, P., Caudill, M. A., Federman, C. W., & Guberman, C. (2000). Predicting completion of a cognitive-behavioral pain management program by initial measures of a chronic pain patient's readiness for change. *Clinical Journal of Pain, 16*, 352–359.
- Blanchard, E. B. (1979). Biofeedback and the modification of cardiovascular dysfunction. In R. J. Gatchel & K. P. Price (Eds.), *Clinical*

- applications of biofeedback: Appraisal and status* (pp. 112–131). New York: Pergamon Press.
- Boothby, J. L., Thorn, B. E., Stroud, M. W., & Jensen, M. P. (1999). Coping with chronic pain. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 343–359). New York: Guilford Press.
- Bradley, L. A., Alarcon, F. S., Triana, M., Aaron, L. A., Alexander, R. W., Stewart, K. E., et al. (1994). Health care seeking behavior in fibromyalgia: Association with pain thresholds, symptom severity, and psychiatric morbidity. *Journal of Musculoskeletal Pain, 2*, 79–87.
- Burns, J. W., Wiegner, S., Derleth, M., Kiselica, K., & Pawl, R. (1997). Linking symptom-specific physiological reactivity to pain severity in chronic low back pain patients: A test of mediation and moderation models. *Health Psychology, 16*, 319–326.
- Burton, A. K., Tillotson, K. M., Main, C. J., & Hollis, S. (1995). Psychosocial predictors of outcome in acute and subacute low back trouble. *Spine, 20*, 722–728.
- Chambless, D. L., Baker, M. J., Baucom, D. H., Beutler, L. E., Calhoun, K., & Crits-Christoph, P. (1998). Update on empirically validated therapies. II. *Clinical Psychologist, 51*, 3–16.
- Chochinov, H. M., & Breitbart, W. (Eds.). (2000). *Handbook of psychiatry in palliative medicine*. New York: Oxford University Press.
- Cioffi, D. (1991). Beyond attentional strategies: A cognitive-perceptual model of somatic interpretation. *Psychological Bulletin, 109*, 25–41.
- Council, J. R., Ahern, D. K., Follick, M. J., & Kline, C. L. (1988). Expectancies and functional impairment in chronic low back pain. *Pain, 33*, 323–331.
- Crombez, G., Vervaeke, L., Lysens, R., Eelen, P., & Baeyens, F. (1998). Avoidance and confrontation of painful, back-straining movements in chronic back pain patients. *Behavior Modification, 2*, 62–77.
- Crombez, G., Vlaeyen, J. W., & Heuts, P. H. (1999). Pain-related fear is more disabling than pain itself: Evidence on the role of pain-related fear in chronic back pain disability. *Pain, 80*, 329–339.
- Crombez, G., Vlaeyen, J. W. S., Heuts, P. H. T. G., & Lysens, R. (1999). Fear of pain is more disabling than the pain itself: Further evidence on the role of pain-related fear in chronic back pain disability. *Pain, 80*, 529–539.
- Dahlstrom, L., Widmark, G., & Carlsson, S. G. (1997). Cognitive-behavioral profiles among different categories of orofacial pain patients: Diagnostic and treatment implications. *European Journal of Oral Science, 105*, 377–383.
- Davey, G. (1997). *Phobias: A handbook of theory, research and treatment*. Chichester, England: Wiley.
- DeGood, D. E., & Kiernan, B. (1996). Perception of fault in patients with chronic pain. *Pain, 64*, 153–159.
- Dolce, J. J., Crocker, M. F., Moletteire, C., & Doleys, D. M. (1986). Exercise quotas, anticipatory concern and self-efficacy expectancies in chronic pain: A preliminary report. *Pain, 24*, 365–375.
- Dolce, J. J., Doleys, D. M., Raczynski, J. M., Lossie, J., Poole, L., & Smith, M. (1986). The role of self-efficacy expectancies in the prediction of pain tolerance. *Pain, 27*, 261–272.
- Dworkin, R. H., Hartstein, G., Rosner, H. L., Walther, R. R., Sweny, E. W., & Brand, L. (1992). A high-risk method for studying psychosocial antecedents of chronic pain: The prospective investigation of herpes zoster. *Journal of Abnormal Psychology, 101*, 200–205.
- Dworkin, S. F., & LeResche, L. (Eds.). (1992). Research diagnostic criteria for temporomandibular disorders: Review, criteria, examinations and specifications, critique. *Journal of Craniomandibular Disorders, 6*, 301–355.
- Dworkin, S. F., Turner, J. A., Wilson, L., Massoth, D., Whitney, C., Huggins, K. H., et al. (1994). Brief group cognitive-behavioral intervention for temporomandibular disorders. *Pain, 59*, 175–187.
- Epker, J., & Gatchel, R. J. (2000). Coping profile differences in the biopsychosocial functioning of patients with temporomandibular disorders. *Psychosomatic Medicine, 62*, 69–75.
- Epstein, L. H. (1984). Direct effects of compliance on health outcome. *Health Psychology, 3*, 385–393.
- Flor, H., Fydrich, T., & Turk, D. C. (1992). Efficacy of multidisciplinary pain treatment centers: A meta-analytic review. *Pain, 49*, 221–230.
- Flor, H., & Turk, D. C. (1988). Chronic back pain and rheumatoid arthritis: Predicting pain and disability from cognitive variables. *Journal of Behavioral Medicine, 11*, 251–265.
- Flor, H., & Turk, D. C. (1989). The psychophysiology of chronic pain: Do chronic pain patients exhibit symptom-specific psychophysiological responses? *Psychological Bulletin, 105*, 215–259.
- Gatchel, R. J., & Epker, J. (1999). Psychosocial predictors of chronic pain and response to treatment. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 412–434). New York: Guilford Press.
- Gatchel, R. J., & Turk, D. C. (Eds.). (1996). *Psychological approaches to pain management: A practitioner's handbook*. New York: Guilford Press.
- Gatchel, R. J., & Turk, D. C. (Eds.). (1999). *Psychosocial factors in pain: Critical perspectives*. New York: Guilford Press.
- Goossens, M., Ruten-Van Molken, M., Kole-Snijders, A., Vlaeyen, J., van Breukelen, G., & Leidl, R. (1998). Health economic assessment of behavioral rehabilitation in chronic low back pain: A randomized clinical trial. *Health Economics, 7*, 39–51.
- Greenfield, S., Fitzcharles, M. A., & Esdaile, J. M. (1992). Reactive fibromyalgia syndrome. *Arthritis & Rheumatism, 35*, 678–681.
- Haldorsen, E. M., Kronholm, K., Skouen, J. S., & Ursin, H. (1998). Multimodal cognitive behavioral treatment of patients sicklisted for musculoskeletal pain: A randomized controlled study. *Scandinavian Journal of Rheumatology, 27*, 16–25.
- Hasenbring, M., Ulrich, H. W., Hartmann, M., & Soyka, D. (1999). The efficacy of a risk factor-based cognitive behavioral intervention and electromyographic biofeedback in patients with acute sciatic pain: An attempt to prevent chronicity. *Spine, 24*, 2525–2535.
- Hildebrandt, J., Pflingsten, M., Saur, P., & Jansen, J. (1997). Prediction of success from a multidisciplinary program for chronic low back pain. *Spine, 22*, 990–1001.
- Holroyd, K., & Lipchik, G. (1999). Psychological management of recurrent headache disorders: Progress and prospects. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 193–212). New York: Guilford Press.
- Hurley, D. A., Duso, T. E., McDonough, S. M., Moore, A. P., Linton, S. J., & Baxter, D. G. (2000). Biopsychosocial screening questionnaire for patients with low back pain: Preliminary report of utility in physiotherapy practice in Northern Ireland. *Clinical Journal of Pain, 16*, 214–228.
- Jamison, R. N., Rudy, T. E., Penzien, D. B., & Mosley, T. H., Jr. (1994). Cognitive-behavioral classifications of chronic pain: Replication and extension of empirically derived patient profiles. *Pain, 57*, 277–292.
- Jensen, M. P. (1996). Enhancing motivation to change in pain treatment. In R. J. Gatchel & D. C. Turk (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp. 78–111). New York: Guilford Press.
- Jensen, M. P., Nielson, W. R., Romano, J. M., Hill, M. L., & Turner, J. A. (2000). Further evaluation of the pain stages of change questionnaire: Is the transtheoretical model of change useful for patients with chronic pain? *Pain, 86*, 255–264.
- Jensen, M. P., Romano, J. M., Turner, J. A., Good, A. B., & Wald, L. H. (1999). Patient beliefs predict patient functioning: Further support for a cognitive-behavioral model of chronic pain. *Pain, 81*, 94–104.
- Jensen, M. P., Turner, J. A., Romano, J. M., & Lawler, B. K. (1994). Relationship of pain-specific beliefs to chronic pain adjustment. *Pain, 57*, 361–369.
- Johansson, E., & Lindberg, P. (2000). Low back pain patients in primary care: Subgroups based on the Multidimensional Pain Inventory. *International Journal of Behavioral Medicine, 7*, 340–352.

- Keefe, F. J., Affleck, J. C., Lefebvre, J. C., Starr, K., Caldwell, D. S., & Tennen, H. (1997). Pain coping strategies and coping efficacy in rheumatoid arthritis: A daily process analysis. *Pain, 69*, 35–42.
- Keefe, F. J., Lefebvre, J. C., Kerns, R. D., Rosenberg, R., Baupre, P., Prochaska, J., et al. (2000). Understanding the adoption of arthritis self-management: Stages of change profiles among arthritis patients. *Pain, 87*, 303–313.
- Keefe, F. J., & Van Horn, Y. V. (1993). Cognitive-behavioral treatment of rheumatoid arthritis pain: Maintaining treatment gains. *Arthritis Care and Research, 6*, 213–222.
- Kendall, N. A. S., Linton, S. J., & Main, C. J. (1997). *Guide to assessing psychosocial yellow flags in acute low back pain: Risk factors for long-term disability and work loss*. Wellington, New Zealand: Accident Rehabilitation and Compensation Insurance Corporation of New Zealand and the National Health Committee.
- Kerns, R. D., & Rosenberg, R. (2000). Predicting responses to self-management treatments for chronic pain: Application of the pain stages of change model. *Pain, 84*, 49–55.
- Kerns, R. D., Rosenberg, R., Jamison, R. N., Caudill, M. A., & Haythornthwaite, J. (1997). Readiness to adopt a self-management approach to chronic pain: The Pain Stages of Change Questionnaire (PSOCQ). *Pain, 72*, 227–234.
- Kerns, R. D., Turk, D. C., & Rudy, T. E. (1985). The West Haven–Yale Multidimensional Pain Inventory (WHYMPI). *Pain, 23*, 345–356.
- Klenerman, L., Slade, P. D., Stanley, I. M., Pennie, B., Reilly, J. P., Atkinson, L. E., et al. (1995). The prediction of chronicity in patients with an acute attack of low back pain in a general practice setting. *Spine, 4*, 345–356.
- Kole-Snijders, A. M. J., Vlaeyen, J. W. S., Goossens, M. E. J. B., Rutten-van Molken, M. P. M. H., Heuts, P. H. T. G., van Breukelen, G., & van Eck, H. (1999). Chronic low-back pain: What does cognitive coping skills training add to operant behavioral treatment? Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 67*, 931–944.
- Lanes, T. C., Gauron, E. F., Spratt, K. F., Wernimont, T. J., Found, E. M., & Weinstein, J. N. (1995). Long-term follow-up of patients with chronic back pain treated in a multidisciplinary rehabilitation program. *Spine, 20*, 801–806.
- Linton, S. J., & Bradley, L. A. (1996). Strategies for the prevention of chronic pain. In R. J. Gatchel & D. C. Turk (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp. 458–485). New York: Guilford Press.
- Linton, S. J., Bradley, L. A., Jensen, I., Spangfort, E., & Sundell, L. (1989). The secondary prevention of low back pain: A controlled study with follow-up. *Pain, 36*, 197–207.
- Linton, S. J., & Hallden, K. (1997). Risk factors and the natural course of acute and recurrent musculoskeletal pain: Developing a screening instrument. In T. S. Jensen, J. A. Turner, & Z. Wiesenfeld-Hallin (Eds.), *Proceedings of the Eighth World Congress on Pain* (pp. 527–536). Seattle, WA: IASP Press.
- Loeser, J. D., Butler, S. D., Chapman, C. R., & Turk, D. C. (Eds.). (2001). *Bonica's management of pain* (3rd ed.). Philadelphia: Lippincott Williams & Wilkins.
- Lorig, K., Chastain, R. L., Ung, E., Shoor, S., & Holman, H. R. (1989). Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arthritis and Rheumatism, 32*, 37–44.
- Lorig, K., Mazonson, P., & Holman, H. (1993). Evidence suggesting that health education for self-management in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis & Rheumatism, 36*, 439–446.
- Lutz, R. W., Silbret, M., & Olshan, N. (1983). Treatment outcome and compliance with therapeutic regimens: Long-term follow-up of a multidisciplinary pain program. *Pain, 17*, 301–308.
- Marlatt, G. A., & Gordon, J. R. (1981). *Relapse prevention*. New York: Guilford Press.
- Mayer, T. G., & Gatchel, R. J. (1988). *Functional restoration for spinal disorders: The sports medicine approach*. Philadelphia: Lea & Febiger.
- Mayou, R. A., Bryant, B. M., Sanders, D., Bass, C., Klimes, I., & Forfar, C. (1997). A controlled trial of cognitive behavioural therapy for non-cardiac chest pain. *Psychological Medicine, 27*, 1021–1032.
- McCracken, L. M., & Gross, R. T. (1993). Does anxiety affect coping with chronic pain? *Clinical Journal of Pain, 9*, 253–259.
- McCracken, L. M., & Gross, R. T. (1998). The role of pain-related anxiety reduction in the outcome of multidisciplinary treatment for chronic low back pain: Preliminary results. *Journal of Occupational Rehabilitation, 8*, 179–189.
- McCracken, L. M., Gross, R. T., Sorg, P. J., & Edmands, T. A. (1993). Prediction of pain in patients with chronic low back pain: Effects of inaccurate prediction and pain-related anxiety. *Behavior Research and Therapy, 31*, 647–652.
- Mikail, S. F., Henderson, P. R., & Tasca, G. A. (1994). An interpersonally based model of chronic pain: An application of attachment theory. *Clinical Psychology Review, 14*, 1–16.
- Moore, J. E., Von Korff, M., Cherkin, D., Saunders, K., & Lorig, K. (2000). A randomized trial of a cognitive-behavioral program for enhancing back pain self-care in a primary care setting. *Pain, 88*, 145–153.
- Morley, S., Eccleston, C., & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain, 80*, 1–13.
- National Institutes of Health Technology Assessment Panel on Integration of Behavioral and Relaxation Approaches Into the Treatment of Chronic Pain and Insomnia. (1996). Integration of behavioral and relaxation approaches into the treatment of chronic pain and insomnia. *Journal of the American Medical Association, 276*, 313–318.
- Nicassio, P. M., Radojevic, V., Weisman, M. H., Schuman, C., Kim, J., Schoenfeld-Smith, K., & Krall, T. (1997). A comparison of behavioral and educational interventions for fibromyalgia. *Journal of Rheumatology, 24*, 2000–2007.
- Nielson, W., Harth, M., & Bell, D. (1997). Out-patient cognitive-behavioral treatment of fibromyalgia: Impact on pain response and health status. *Pain Research and Management, 2*, 145–150.
- O'Leary, A., Shoor, S., Lorig, K., & Holman, H. R. (1988). A cognitive-behavioral treatment for rheumatoid arthritis. *Health Psychology, 7*, 527–544.
- Pfingsten, M., Hildebrandt, J., Leibing, E., Franz, C., & Saur, P. (1997). Effectiveness of a multimodal treatment program for chronic low-back pain. *Pain, 73*, 77–85.
- Piotrowski, C. (1998). Assessment of pain: A survey of practicing clinicians. *Perceptual and Motor Skills, 86*, 181–182.
- Price, D. D. (1999). *Psychological mechanisms of pain and analgesia: Progress in pain research and management* (Vol. 15). Seattle, WA: IASP Press.
- Prochaska, J. O., & DiClemente, C. C. (1998). Towards a comprehensive, transtheoretical model of change: States of change and addictive behaviors. In W. R. Miller & N. Heather (Eds.), *Applied clinical psychology: Treating addictive behaviors* (2nd ed., pp. 3–24). New York: Plenum Press.
- Rainville, P., Duncan, G. H., Price, D. D., Carrier, B., & Bushnell, M. C. (1997). Pain affect encoded in human anterior cingulate but not somatosensory cortex. *Science, 277*, 968–971.
- Richmond, R. L., & Carmody, T. P. (1999). Dropout from treatment for chronic low back pain. *Professional Psychology, 30*, 51–55.
- Rudy, T. E., Turk, D. C., Kubinski, J. A., & Zaki, H. S. (1995). Differential treatment responses of TMD patients as a function of psychological characteristics. *Pain, 61*, 103–112.
- Shutty, M. S., DeGood, D. E., & Tuttle, D. H. (1990). Chronic pain

- patients' beliefs about their pain and treatment outcome. *Archives of Physical Medicine and Rehabilitation*, 71, 128–132.
- Smarr, K. L., Parker, J. C., Wright, G. E., Stucky-Ropp, R. C., Bucklew, S. P., Hoffman, R. W., et al. (1997). The importance of self-efficacy in rheumatoid arthritis. *Arthritis Care and Research*, 10, 18–26.
- Spinhoven, P., Ter Kuile, M. M., Linssen, A. C. G., & Gazendam, B. (1989). Pain coping strategies in a Dutch population of chronic low back pain patients. *Pain*, 37, 77–83.
- Stone, A. A., Broderick, J. E., Porter, L. S., & Kaell, A. T. (1997). The experience of rheumatoid arthritis and fatigue: Examining momentary reports and correlates over one week. *Arthritis Care and Research*, 10, 185–192.
- Stroud, M. W., Thorn, B. E., Jensen, M. P., & Boothby, J. L. (2000). The relation between pain beliefs, negative thoughts, and psychosocial functioning in chronic pain patients. *Pain*, 84, 347–352.
- Tota-Faucette, M. E., Gil, K. M., Williams, D. A., Keefe, F. J., & Goli, V. (1993). Predictors of response to pain management treatment. The role of family environment and changes in cognitive processes. *Clinical Journal of Pain*, 9, 115–123.
- Turk, D. C. (1990). Customizing treatment for chronic pain patients: Who, what, and why. *Clinical Journal of Pain*, 6, 255–270.
- Turk, D. C. (1997). Transition from acute to chronic pain: Role of demographic and psychosocial factors. In T. S. Jensen, J. A. Turner, & Z. Wiesenfeld-Hallin (Eds.), *Proceedings of the 8th World Congress on Pain: Progress in pain research and management* (pp. 185–213). Seattle, WA: IASP Press.
- Turk, D. C., & Flor, H. (1999). Chronic pain: A biobehavioral perspective. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 18–34). New York: Guilford Press.
- Turk, D. C., & Melzack, R. (2001). *Handbook of pain assessment* (2nd ed). New York: Guilford Press.
- Turk, D. C., & Okifuji, A. (1996). Perception of traumatic onset, compensation status, and physical findings: Impact on pain severity, emotional distress, and disability in chronic pain patients. *Journal of Behavioral Medicine*, 19, 435–453.
- Turk, D. C., & Okifuji, A. (1998). Treatment of chronic pain patients: Clinical outcome, cost-effectiveness, and cost-benefits. *Critical Reviews in Physical Medicine & Rehabilitation*, 10, 181–208.
- Turk, D. C., Okifuji, A., Sinclair, J. D., & Starz, T. W. (1996). Effects of type of symptom onset on psychological distress and disability in fibromyalgia syndrome patients. *Pain*, 68, 423–430.
- Turk, D. C., Okifuji, A., Sinclair, J. D., & Starz, T. W. (1998). Interdisciplinary treatment for fibromyalgia syndrome: Clinical and statistical significance. *Arthritis Care & Research*, 11, 186–195.
- Turk, D. C., Okifuji, A., Starz, T. W., & Sinclair, J. D. (1998). Differential responses by psychosocial subgroups of fibromyalgia syndrome patients to an interdisciplinary treatment. *Arthritis Care & Research*, 11, 397–404.
- Turk, D. C., & Rudy, T. E. (1988). Toward an empirically derived taxonomy of chronic pain patients: Integration of psychological assessment data. *Journal of Consulting and Clinical Psychology*, 56, 233–238.
- Turk, D. C., & Rudy, T. E. (1990a). Neglected factors in chronic pain treatment outcome studies—Referral patterns, failure to enter treatment, and attrition. *Pain*, 43, 7–25.
- Turk, D. C., & Rudy, T. E. (1990b). Toward an empirically derived taxonomy of chronic pain patients: Integration of psychological assessment data. *Journal of Consulting and Clinical Psychology*, 56, 233–238.
- Turk, D. C., & Rudy, T. E. (1991). Neglected topics in the treatment of chronic pain patients: Relapse, noncompliance, and adherence enhancement. *Pain*, 44, 5–28.
- Turk, D. C., Rudy, T. E., & Sorkin, B. A. (1993). Neglected topics in chronic pain treatment outcome studies: Determination of success. *Pain*, 53, 3–16.
- Turk, D. C., & Salovey, P. (1986). Cognitive structures, cognitive processes, and cognitive-behavior modification: I. Client issues. *Cognitive Therapy and Research*, 9, 1–17.
- Turk, D. C., Sist, T. C., Okifuji, A., Miner, M. F., Florio, G., Harrison, P., et al. (1998). Adaptation to metastatic cancer pain, regional/local cancer pain and non-cancer pain: Role of psychological and behavioral factors. *Pain*, 74, 247–256.
- Turner, J. A., Franklin, G., & Turk, D. C. (2000). Predictors of long-term disability in injured workers: A systematic literature synthesis. *American Journal of Industrial Medicine*, 38, 707–722.
- Turner, J. A., Jensen, M. P., & Romano, J. M. (2000). Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? *Pain*, 85, 115–125.
- Vassend, O., Krogstad, B. S., & Dahl, B. L. (1995). Negative affectivity, somatic complaints, and symptoms of temporomandibular disorders. *Journal of Psychosomatic Research*, 39, 889–899.
- Vendrig, A. A., Van Akkerveken, P. F., & McWhorter, K. R. (2000). Results of multimodal treatment program for patients with chronic symptoms after whiplash injury of the neck. *Spine*, 25, 238–244.
- Vlaeyen, J. W., Haazen I. W., Schuerman, J. A., Kole-Snijders, A. M. J., & van Eck, H. (1995). Behavioural rehabilitation of chronic low back pain: Comparison of an operant treatment, an operant-cognitive treatment and an operant-respondent treatment. *British Journal of Clinical Psychology*, 34, 95–118.
- Vlaeyen, J. W., Kole-Snijders, A. M., Boeren, R. G., & van Eck, H. (1995). Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. *Pain*, 62, 363–372.
- Vlaeyen, J. W. S., Nooyen-Haazen, I. W. C. J., Goossens, M. E. J. B., van Breukelen, G., Heuts, P. H. T. G., & Goei-The, H. (1997). The role of fear in the cognitive-educational treatment of fibromyalgia. In T. S. Jensen, J. A. Turner, & Z. Wiesenfeld-Hallin (Eds.), *Progress in pain research and management* (Vol. 8, pp. 693–706). Seattle, WA: IASP Press.
- Vlaeyen, J. W. S., Seelen, H. A. M., Peters, M., de Jong, P., Aretz, E., Beisiegel, E., & Weber, W. E. J. (1999). Fear of movement/(re)injury and muscular reactivity in chronic low back pain patients: An experimental investigation. *Pain*, 82, 297–304.
- Von Korff, M. (1999). Pain management in primary care: An individualized stepped-care approach. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 360–373). New York: Guilford Press.
- Von Korff, M., Moore, J. E., Lorig, K., Cherkin, D. C., Saunders, K., Gonzalez, V. M., et al. (1998). A randomized trial of a lay person-led self-management group intervention for back pain patients in primary care. *Spine*, 23, 2608–2615.
- Waddell, G. (1998). *The back pain revolution*. Edinburgh, Scotland: Churchill Livingstone.
- Waddell, G., Newton, M., Henderson, I., Somerville, D., & Main, C. (1993). A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain*, 52, 157–168.
- Walco, G. A., & Harkins, S. W. (1999). Lifespan developmental approaches to pain. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 107–117). New York: Guilford Press.
- Wall, P. D., & Melzack, R. (Eds.). (1999). *Textbook of pain* (4th ed.). New York: Churchill Livingstone.
- Wolfe, F., Smythe, H. A., Yunus, M. B., Bennett, R. M., Bombardier, C., Goldenberg, D. L., et al. (1990). The American College of Rheumatology criteria for the classification of fibromyalgia: Report of the Multi-center Criteria Committee. *Arthritis & Rheumatism*, 33, 160–172.

Received February 12, 2001

Revision received August 25, 2001

Accepted August 27, 2001 ■