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FOCUS ARTICLE

Evidence-Based Scientific Data Documenting the Treatment and Cost-Effectiveness of Comprehensive Pain Programs for Chronic Nonmalignant Pain

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Abstract: Chronic pain is one of the most prevalent and costly problems in the United States today. Traditional medical treatments for it, though, have not been consistently efficacious or cost-effective. In contrast, more recent comprehensive pain programs (CPPs) have been shown to be both therapeutically efficacious and cost-effective. The present study reviews available evidence demonstrating the therapeutic efficacy and cost-effectiveness of CPPs, relative to conventional medical treatment. Searches of the chronic pain treatment literature during the past decade were conducted for this purpose, using MEDLINE and PSYCHLIT. Studies reporting treatment outcome results for patients with chronic pain were selected, and data on the major outcome variables of self-reported pain, function, healthcare utilization and cost, medication use, work factors, and insurance claims were evaluated. When available, conventional medical treatments were used as the benchmark against which CPPs were evaluated. This review clearly demonstrates that CPPs offer the most efficacious and cost-effective, evidence-based treatment for persons with chronic pain. Unfortunately, such programs are not being taken advantage of because of short-sighted cost-containment policies of third-party payers.

Perspective: A comprehensive review was conducted of all studies in the scientific literature reporting treatment outcomes for patients with chronic pain. This review clearly revealed that CPPs offer the most efficacious and cost-effective treatment for persons with chronic pain, relative to a host of widely used conventional medical treatment.

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Key words: Chronic pain, comprehensive pain programs, biopsychosocial, interdisciplinary treatment, cost-effectiveness, treatment efficacy.

Specialized pain clinics are relatively new. Earlier pain clinics were basically simple, treating pain with local anesthetics and neural blockades. In the past few decades, however, various clinical services for treat-

ing pain have proliferated. In 2001, approximately 3,800 pain programs, clinics, centers, and solo practices in the United States provided care for 8 million persons with pain.⁶⁶ Some of these clinics are modality specific (eg, nerve block clinics, massage, biofeedback); some are diagnosis specific (eg, headache clinic, pelvic pain clinic); and some are specialized pain centers in which clinicians with expertise in various pain-related disciplines (eg, physicians, physical therapists, psychologists) work as a team to provide comprehensive pain care. As will be reviewed, these latter comprehensive pain programs (CPPs) have been the only ones that have been consis-

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tently documented to be both therapeutically efficacious and cost-effective for treating chronic pain. Unfortunately, however, many third-party payers refuse to reimburse such programs because of their misunderstanding of them and misguided attempts at cost containment. This has created a major crisis and conundrum in the field of chronic pain management: Even though there is now more evidence-based research documenting their effectiveness relative to any other medical treatment approach, many such programs are being closed because of the refusal of third-party payers to utilize them. In response to this “clear and present danger” of depriving patients with chronic pain of the most effective treatment currently available, the President of the American Pain Society (Dennis Turk, PhD) convened a Task Force on Comprehensive Pain Rehabilitation, chaired by Robert J. Gatchel, PhD, ABPP.⁵² The charge of this Task Force was to develop a report of published results that support the clinical and cost-effectiveness of comprehensive pain programs. The present article presents these results.

Chronic pain, one of the most prevalent physical complaints, is loosely defined as prolonged pain of at least 3 months’ duration. Epidemiological research has shown that the prevalence of chronic pain varies on the basis of how the questions are asked and how chronic pain is defined. However, researchers estimated that 10% to 20% of adults in the general population experience persistent pain of at least 3 months’ duration.^{11,54,119} In a large-scale epidemiological study, Von Korff et al¹²¹ estimated a 19% prevalence for chronic spinal pain (neck and back) in the United States in the previous year and a 29% lifetime rate. The American Academy of Pain Management³ stated that more than half of all Americans (approximately 57%) reported experiencing recurrent or chronic pain in the past year. About 62% of those individuals had been in pain for more than 1 year, and 40% reported that they are constantly in pain. Congress has also passed a provision into law declaring this decade the “Decade of Pain Control and Research.”

Chronic pain is not only prevalent but also costly, with the total estimated healthcare costs to Americans of more than \$70 billion per year.³ In addition, earlier estimates indicated that pain is responsible for a half million lost workdays and costs more than \$150 billion annually in healthcare, disability, and related expenses in the United States alone.^{72,115} Musculoskeletal conditions have a significant effect on the U.S. population and the healthcare system, with the costs for healthcare increasing 70% between 1988 and 1995.² The high costs of chronic pain reflect the complexity of the disorder. Chronic pain is typically compounded with other physical and functional syndromes. More than 87% of persons with chronic spinal pain in the United States, for example, present at least one other comorbid pain disorder (69%), functional disorder (55%), or psychiatric disorder.¹²¹ Clearly, the interaction of these problems determines the socioeconomic effect of pain. For example, not all patients with chronic pain incur elevated healthcare

utilization. Blyth et al¹¹ found that it is the significant functional disability that drives medical costs upward.

The trends discussed above are not isolated only to the United States. In the United Kingdom, more than 50% of patients going to general practitioners complain of chronic pain; however, less than one-third of these individuals take analgesics or seek treatment. “Severe pain” with apparent significant functional limitation was reported by 6% of patients, and 61% of those were not working, relative to 1.3% of individuals with no pain and 13% of individuals with pain without severe functional limitation.¹⁵ Thus, chronic pain is not only a pain disorder but also a disorder of functional illness that encompasses pain, function, work, healthcare utilization, and indemnity issues.

Similarly, such high prevalences and costs are being experienced worldwide. For example, Ekman et al³⁷ reported that one type of chronic pain—low back pain—represented 11% of the total costs for short-term sick leave in Sweden, as well as about 13% of all early retirement pensions that were granted. There has now been careful documentation of such high costs of various types of chronic pain from other countries, such as The Netherlands,^{6,13} New Zealand,⁹² Australia,¹² Denmark,³⁹ Canada,¹¹⁷ Spain,²⁵ and Italy.²⁴ Thus, there is a clear chronic pain crisis worldwide, in terms of both human suffering and economic costs.

Healthcare expenditures make up only about 10% of the costs of chronic pain in the United States, yet the total costs are massive. For example, pain medications contribute substantially to healthcare costs for those experiencing pain. More than 312 million prescriptions for analgesics (137 million for opioids) are written each year (Merck Pharmaceutical, 2002, personal communication with Mark Williams). As the upper limits of annual costs for medication nears \$21,500 (\$19,823 in 2002, with the annual inflation rate of 3%⁹⁹), the total could be as high as \$62.5 billion annually. Moreover, the costs of medications used to treat pain increased by an average of 27% from fiscal year 2000 through fiscal year 2001.⁷⁴

Another common treatment for chronic pain is surgery. In a meta-analysis of interdisciplinary pain rehabilitation programs, Flor et al⁴³ discovered that more than 54% of patients referred to these facilities had had at least one prior surgery to treat their pain, and the average patient had 1.76 surgeries. Arguably, the most frequent class of patients with chronic pain treated surgically is spinal disorders. More than 317,000 lumbar surgeries are performed each year—primarily for pain⁸⁰—at an average cost of \$15,000.⁴⁵ Thus, the total cost for back surgery alone is in excess of \$4.7 billion annually. Between 1985 and 1995, the number of spinal surgeries increased by 55%.³²

The Biopsychosocial Model of Pain and Disability

The biopsychosocial approach to pain and disability is widely accepted as the most heuristic perspective to the understanding and treatment of chronic pain disorders and has replaced the outdated biomedical reductionistic

approach (eg,^{51,109,111}). The biopsychosocial approach views pain and disability as a complex and dynamic interaction among physiologic, psychologic, and social factors that perpetuates—and may even worsen—the clinical presentation. In stark contrast, the traditional biomedical approach assumes that symptoms have specific physical causes, and attempts are made to eradicate the cause by rectifying the physical pathology or by cutting or blocking the pain pathways pharmacologically or surgically. The biomedical approach traditionally has promised a cure or, barring that, elimination of a significant amount of pain. Currently, though, there are no definitive cures for the most prevalent chronic pain syndromes such as back pain, upper extremity pain disability, peripheral neuropathies, and so on. Holding out the promise for an elusive cure adversely affects people with musculoskeletal pain because none currently exists, thereby driving up healthcare costs. Rehabilitation rather than cure is the most appropriate therapeutic option.

Indeed, chronic pain can rarely be understood by the linear, nociceptive mechanisms. Healthcare providers often are unable to identify specific pathophysiological mechanisms underlying persistent pain complaints. The absence of the documentable isomorphic relation between pathology and pain is frequently confused as a psychiatric condition. Although certain psychopathology can be expressed as a medical complaint (eg, hallucination, malingering, factitious disorder), most chronic pain does not present psychopathology as a sole cause. Pain and disability are most appropriately viewed as major stressors in a person's life that trigger a certain degree of emotional distress, such as fear, anxiety, depression, or uncertainty. Such psychosocial responses, in attempting to understand and manage the pain and disability, are to be expected as a concomitant of the actual pain event.

Comprehensive Pain Programs: An Overview

With the above biopsychosocial perspective in mind, the emphasis on dealing with psychosocial factors in achieving optimal rehabilitation outcomes in CPPs does not assume that a "cure" of major psychopathology will be an important component of the treatment process. Rather, everyday psychosocial reactions to the stress of pain are to be expected. Therefore, healthcare providers need to be sensitive to individuals' emotional concerns about what the pain or disability may mean in terms of healing time and prognosis (eg, fear of the unknown), whether this will affect their ability to return to work and to maintain their expected income level (eg, uncertainty and, sometimes, depressed mood), as well as issues concerning obstacles that they may encounter in "working through" the healthcare system (eg, distress, anger, hopelessness). The comprehensive interventions reviewed in this paper are meant to help manage these normal emotional reactions to a major stressor such as pain. Intervention techniques are developed to help manage the pain and the accompanying psychosocial concomitants—and not to cure any major psychopathology.

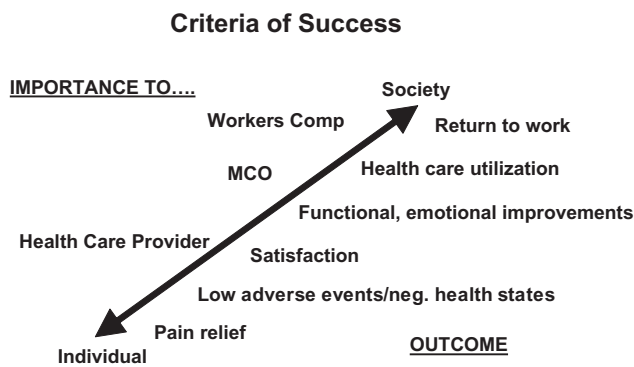


Figure 1. Outcomes as a function of the various stake holders involved in pain management.

An overview of potential pain mechanisms is beyond the scope of this paper. Pain is a perceptual experience, centrally modulated through internal physiologic and psychologic events, as well as external, environmental factors. Pain is not a simple sensory experience. Such complexity is incorporated in the formal definition of pain, "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."⁵⁸ No single medication, procedure, or therapy can address all the aspects involved in a complex case of chronic pain.

What complicates the already complex picture of pain management is the fact that therapy outcomes for chronic pain require multidimensional assessment because (a) chronic pain affects multiple domains of life; (b) different parties involved in the care of persons with chronic pain are interested in different outcomes; and (c) those outcomes are not necessarily correlated with one another.^{75,104,122,125} The first point is self-explanatory. Those who are afflicted by chronic pain report significant decreases in quality of life. Patients and their families may be interested in symptom reduction and improvement in the quality of life; however, third-party payers may be more interested in identifying the treatment that will reduce the future needs for healthcare. Workers compensation board members, on the other hand, may be interested in returning their workers back to gainful employment and closing the claims. Indeed, as highlighted by Schultz and Gatchel,⁹⁰ the multiple stakeholders involved in the healthcare process add a political dimension to pain assessment and the treatment process. A number of variables can be assessed to evaluate treatment outcome studies, such as self-reported pain, function (activities of daily living), healthcare utilization, return-to-work factors, medication use, and insurance case closure. The importance of each outcome varies depending on who is asked—patients, healthcare providers, managed care organizations, workers compensation carriers, or other third-party payers (see Fig 1).

At the time this paper was written, the only treatment approach that scientifically pursued the various outcomes was a rehabilitation program that incorporated multiple therapy modalities. Such CPPs proliferated in

the 1980s, which stimulated a great deal of outcome research in pain medicine. The criticism levied against CPPs is that they are expensive but offer only limited clinical benefits. Available pain literature, however, cannot be construed to support this erroneous claim. The primary purpose of this paper is to present the available evidence that demonstrates the efficaciousness and cost-effectiveness where activating, rehabilitative therapies have been provided by a multidisciplinary treatment team. When available, conventional medical treatments were used as the benchmark against which CPP treatments were evaluated; however, direct comparisons are difficult because of the large variability in the patient characteristics. CPP patients exhibit higher degrees of pain, disability, and mood dysfunction than patients who have just begun to undergo medical and interventional treatments.²⁷ In practice, patients are tried on medical treatment or surgical repair of pathology (eg, spinal abnormality), and if they do not respond to that treatment, they are sent to a CPP. The effectiveness of CPPs is generally assessed, therefore, on recalcitrant patients.

Studies/Reviews of CPPs for Pain Management

This section is a review of the most methodologically sound studies and evidence-based data evaluating CPPs. Searches of the chronic pain treatment literature during the past decade were conducted for this purpose, using MEDLINE and PSYCHLIT. Among the studies selected were systematic reviews and meta-analysis studies in peer-reviewed journals; randomized, controlled trials in which at least two treatment approaches were compared; and relevant unrandomized trials in which at least two treatment approaches were compared. It should also be noted that as reviewed by Gatchel and McGeary,⁴⁹ randomized, controlled trials are not the only experimental designs that should be relied on to produce trustworthy cause-effect treatment relations. There are a host of other experimental designs, including unrandomized trials, that may be appropriately used to yield important scientific data to help in delineating cause-effect relations. Some may even have greater internal or external validity than certain randomized, controlled trials and often yield a reasonable comparable effect size when compared with randomized designs. Therefore, in the present review, we have included such appropriate uncontrolled trials. Finally, in addition to the aforementioned criteria, only those studies reporting treatment outcomes that were systematically collected on all subjects were included. These outcomes could include data on self-reported pain, function, healthcare utilization and cost, medication use, work factors, and insurance claims. Whenever available, conventional medical treatments were used as a benchmark against which comprehensive pain programs were evaluated.

Functional Restoration

One type of CPP for low back pain, first introduced by Mayer and Gatchel,⁷¹ is functional restoration. Functional restoration is an intensive treatment approach in-

tended for patients experiencing the effects of significant physical deconditioning and chronic disability. The critical elements of a CPP, such as functional restoration, involve the following:

- Formal, repeated quantification of physical deficits to guide, individualize, and monitor physical training progress.
- Psychosocial and socioeconomic assessment to guide, individualize, and monitor disability behavior-oriented interventions and outcomes.
- Multimodal disability management programs using cognitive-behavioral approaches.
- Psychopharmacological interventions for detoxification and psychological management.
- Interdisciplinary, medically directed team approach with formal staffings and frequent team conferences.
- Ongoing outcome assessment using standardized objective outcome criteria.

Initial research showed that a CPP focused on functional restoration, when fully implemented, is associated with substantive improvement in various important socioeconomic outcome measures (eg, return to work and resolution of outstanding legal and medical issues) in chronically disabled patients with spinal disorders in both 1-year follow-up studies^{56,67,68} as well as a 2-year follow-up study.⁶⁹ For example, in the 2-year follow-up study by Mayer et al,⁶⁹ 87% of the functional restoration treatment group was actively working at 2 years, compared with only 41% of a non-treatment comparison group. About twice as many of the comparison group of participants had both additional spine surgery and unsettled workers compensation litigation relative to the treatment group. The comparison group continued with approximately a five-times-higher rate of patient visits to healthcare professionals and had higher rates of recurrence or re-injury. Thus, the results demonstrate the striking effect of a functional restoration program on these important outcome measures in a chronic group consisting primarily of workers compensation cases (traditionally the most difficult cases to treat successfully).

The effectiveness of this original functional restoration program has been independently replicated by Hazard et al⁵⁶ and Patrick et al⁸³ in the United States. Randomized, controlled trials demonstrating positive outcomes include Bendix et al⁸ and Bendix and Bendix⁹ in Denmark; Hildebrandt et al⁵⁷ in Germany; Corey et al²⁶ in Canada; Jousset et al⁵⁹ in France; and Shirado et al⁹³ in Japan. The fact that different clinical treatment teams, functioning in different states and different countries, with markedly different economic and social conditions and workers compensation systems, produced comparable positive outcome results speaks highly for the robustness of the research findings and utility, as well as the fidelity, of this approach to pain management in occupational settings. This functional restoration approach has also been found to be effective with chronic upper extremity disorders.⁴⁰ This type of approach has also been found to be an effective early intervention treat-

ment for preventing chronic disability. For example, in a randomized, controlled study, patients with acute low back pain who were identified as “high risk” for developing chronic back pain disability were randomly assigned to an early functional restoration group or a treatment-as-usual group.⁵⁰ The functional restoration group displayed significantly fewer indexes of chronic pain disability at 1-year follow-up on a wide range of work, healthcare utilization, medication use, and self-reported pain variables. For example, the functional restoration group was less likely to be taking narcotic analgesics (odds ratio = 0.44) and also less likely to be taking psychotropic medications (odds ratio = 0.24). Moreover, the treatment-as-usual group was less likely to have returned to work (odds ratio = 0.55). The cost-comparison savings data from this study were also quite impressive: The treatment-as-usual group cost twice as much as the functional restoration group over a 1-year period.

CPPs in General

There have been other studies demonstrating the effectiveness of CPPs in general—and not just functional restoration—in successfully treating chronic low back pain. For example, van Tulder et al¹¹⁸ found “strong evidence” for such a CPP approach by using the Cochrane Collaboration’s high methodology and analysis standards. In a recent review of different treatment modalities for persistent low back pain published in *The New England Journal of Medicine*, Carragee²⁰ concluded that CPPs that focus on functional improvements produce the best outcomes. Finally, three new prospective, randomized, controlled trials also demonstrated the long-term effectiveness of CPPs. Friedrich et al⁴⁴ conducted a study in which 93 patients with chronic and recurrent low back pain were randomly assigned to either a control group (a standard exercise program) or a CPP. Follow-up assessments at 3.5 weeks, 4 months, 12 months, and 5 years demonstrated the greater long-term efficacy (up to 5 years) of the CPP group in terms of decreased disability and pain intensity scores, as well as increased working ability.

Fairbank et al⁴¹ compared spinal fusion against a CPP with patients with chronic low back pain in a multicenter, randomized, controlled study of 349 patients who had chronic low back pain for at least 1 year. A 24-month follow-up was conducted by using a disability scale (the Oswestry) and the short form (SF)-36. Both groups improved, and there was no evidence that surgery produced better relief than the CPP. Using this same cohort of patients, Rivero-Arias et al⁸⁵ conducted a cost-utility analysis of these data. At the 2-year follow-up, even though there were no significant differences in treatment effectiveness between the two groups, the average cost of surgery was £7,830 (approximately \$14,400), compared with only £4,526 (approximately \$8,323) for the CPP. Thus, these investigators concluded that “A policy in which patients receive spinal fusion surgery as first-line therapy for their chronic low back

pain seems not to be a cost-effective use of healthcare resources at 2-year follow-up.”

Finally, Rasmussen et al⁸⁴ evaluated the rates of lower back pain in a geographical region of Denmark, before and after implementation of two multidisciplinary non-surgical spine clinics (in 1997), and compared these rates with those for the rest of Denmark during the same time periods. Results revealed that the annual rate of low back pain surgeries for patients in this region decreased from about 60 to 80 per 100,000 before 1997 to 40 per 100,000 in 2001. Moreover, the rates of elective, first-time disc surgeries decreased by approximately two thirds. In striking contrast, the annual rates of lumbar disc surgeries for patients in the rest of Denmark remained unchanged during the same time period. Thus, when there is an option for this type of treatment in a community, nonsurgical CPPs can reduce the rates of more costly spine surgery.

A plethora of other studies have demonstrated the effectiveness of CPPs in successfully treating various other prevalent chronic pain syndromes. For example, the American Academy of Orofacial Pain¹ estimates that 75% of the U.S. population experiences temporomandibular joint (TMJ) disorder symptoms during their lifetimes and that 5% to 10% of those require professional treatment. Research also estimates that within a 6- to 12-month period, more than 5.3 million people in the United States seek treatment for TMJ, which can result in a conservative cost estimate of \$2 billion for direct costs of treatment alone.³³ Extrapolating from these figures would bring the total cost of TMJ to more than \$4 billion per year, assuming that the indirect costs probably would exceed direct costs.⁵³

As Gatchel et al⁵³ have reviewed, traditional treatments for TMJ have included interocclusal appliances, nocturnal alarms when clenching, physical therapy, surgery, and occlusal calibration/equilibrium. However, these techniques have not been shown to be very effective. In contrast, CPPs (many of which include a strong cognitive-behavioral intervention) have proven to be effective by independent research teams led by Dworkin,^{34,35} Turk,^{87,103,105} and Gatchel.^{46,53,77} Most recently, Turner et al¹¹⁴ and Gatchel et al⁵³ have reported randomized, controlled trials that demonstrated the short- and long-term efficacy of such programs. Moreover, the study by Gatchel et al⁵³ also found that CPP patients had significantly fewer visits to dental healthcare providers during the year following their treatment, thus suggesting greater cost savings.

Such CPPs have also been shown to be the best treatment of choice for a variety of other chronic pain disorders, such as fibromyalgia, headache, whiplash and neck pain, repetitive strain disorders, and various other musculoskeletal disorders (cf⁸⁹). CPPs including a cognitive-behavioral treatment component also appear to be effective regardless of medical diagnosis. For example, a double-blind, randomized, controlled trial for the treatment of chronic insomnia, which often is seen in a variety of chronic pain syndromes, has been shown to be efficacious.³⁸

Table 1. Studies Demonstrating the Efficacy of Comprehensive Pain Programs

AUTHORS/DATE OF PUBLICATION	STUDY SUMMARY
Turk, 2002	A review of representative published studies evaluating clinical effectiveness of pharmacological treatments, conservative (standard) care, surgery, spinal cord stimulators, implantable drug delivery systems, and CPPs. CPPs were found to provide significantly better outcomes for medication use, healthcare utilization, functional activities, return to work, and closure of disability claims, and with substantially fewer iatrogenic consequences and adverse events (relative to other treatment modalities). Such programs are significantly more cost-effective.
Okifuji, 2003 Lang et al, 2003	A review of the effectiveness of interdisciplinary CPPs. A comparison of the outcome of a multidisciplinary CPP that was organized with cooperation from local healthcare providers and independent physicians who provide usual care for patients with chronic low back pain. Evaluated 6 months after rehabilitation, the multidisciplinary rehabilitation program was found to be significantly better than usual care in improving physical and mental health domains of the SF-36, reducing days off work, and creating higher overall patient appraisal of successful outcome.
Becker et al, 2000	A randomized, controlled study evaluating the effect of outpatient multidisciplinary pain center treatment to treatment by a general practitioner after initial supervision by a pain specialist and to a group of patients who waited 6 months for treatment. Patients receiving outpatient multidisciplinary pain management experienced reduced pain intensity, improved psychological general well-being, and improvements in most of the subscales of the SF-36, relative to the other two groups. After 6 months, these multidisciplinary pain center-treated patients still reported statistically significant less pain and higher general psychological well-being than patients in the other two groups.
Skouen et al, 2002	Study included 195 patients with chronic low back pain who were on an average sick-listed for 3 months. Patients randomly assigned to a light multidisciplinary treatment program, an extensive multidisciplinary treatment program, or treatment as usual by their primary physician. Light multidisciplinary treatment patients demonstrated significantly better results for full return to work than treatment-as-usual patients, but no differences were found between extensive multidisciplinary treatment patients and treatment-as-usual patients. Productivity gains for society from light multidisciplinary treatment versus treatment as usual of 57 patients with low back pain would, during the first 2 years, accumulate to U.S. \$852,000.
Guzman et al, 2001	A systematic literature review of randomized, controlled trials assessing the effectiveness of multidisciplinary biopsychosocial rehabilitation on clinically relevant outcomes in patients with chronic low back pain. There was strong evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration improves function when compared with inpatient or outpatient nonmultidisciplinary treatments. There was also moderate evidence that intensive multidisciplinary rehabilitation reduces pain when compared with outpatient, nonmultidisciplinary rehabilitation, or usual care. The reviewed trials are evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration reduces pain and improves function in patients with chronic low back pain. Less intensive interventions did not show improvements in clinically relevant outcomes.
Flor et al, 1992	After treatment at multidisciplinary pain management centers, patients required one-third the number of surgical interventions and hospitalizations compared with patients treated with alternative medical and surgical care.
Robbins et al, 2003	An evaluation of the therapeutic effectiveness of an interdisciplinary pain management program on a heterogeneous group of chronic pain patients. Successful completion of the program produced significant improvement on a wide range of biopsychosocial and socioeconomic outcomes at 1-year follow-up. Insurance carrier policies of contracting treatment "carve outs" significantly compromised the effectiveness of this evidence-based, best standard of medical care interdisciplinary treatment.
Linton et al, 2005	A randomized controlled trial, acute low back pain patients seen in a primary care setting were randomly assigned to either a standardized, guideline-based treatment as usual or cognitive behavioral treatment and physical therapy. The treatment-as-usual group had a greater number of days off work for back pain during the 12-month follow-up than the other two groups. Risk for developing long-term sick disability leave was more than 5-fold higher in the treatment-as-usual group than the other two groups.

Abbreviation: CPP, comprehensive pain program.

Besides the above, there have been a great number of other investigations demonstrating the effectiveness of CPPs in treating chronic pain syndromes. Many of the early studies were reviewed by Lande and Kulich.⁶³ Subsequently, in a systematic review of studies comparing CPPs to unimodal treatment or no-treatment control patients, which involved a total of 3,089 participants, Mc-

Cracken and Turk⁷³ reported the following outcomes comparisons: return to work, 68% CPP versus 32% unimodal or no treatment; pain reduction, 37% versus 4%; medication reduction, 63% versus 21%; and increases in activity, 53% versus 13%, respectively. Table 1 lists brief summaries of other studies demonstrating the effectiveness of CPPs in general. Other general reviews of the

treatment- and cost-effectiveness of CPPs are as follows: Deschner and Polatin,³⁰ Feuerstein and Zostowny,⁴² Gatchel and Turk,⁴⁷ Okifuji et al,⁸¹ Turk and Burwinkle,¹¹³ Turk and Gatchel,¹⁰⁷ and Wright and Gatchel.¹²⁴ Sanders et al¹⁸⁸ have also delineated evidence-based clinical guidelines for the interdisciplinary management of chronic pain.

Cognitive-Behavioral Treatment

In a very influential early study, Morley et al⁷⁹ reported the results of their systematic review and meta-analysis of the existing randomized trials of cognitive-behavioral therapy as well as behavioral therapy for chronic pain. Their findings concluded that such treatment is effective for a variety of chronic pain conditions. The major goals of such treatment are to replace maladaptive patient cognitions and behaviors with more adaptive ones. Most recently, Linton and Nordin⁶⁴ reported a 5-year follow-up of a randomized, controlled trial of early cognitive-behavioral intervention for back pain. Results demonstrated that this intervention resulted in significantly less pain, produced more active and better quality of life, and resulted in better general health, relative to the comparison group. There were also significantly greater economic benefits associated with the cognitive-behavioral intervention group.

Besides the above studies, there have been numerous other well-conducted studies demonstrating the therapeutic effectiveness of behavioral and cognitive-behavioral treatment techniques (a key component in most CPPs) for treating chronic pain. For example, a study by Brox et al¹⁶ was an exceptional randomized, controlled trial that compared the relative efficacy of lumbar spinal fusion versus CPP (cognitive behavioral therapy plus exercise) for patients with back pain who had documented underlying pathophysiology. A total of 64 participants were randomly assigned into one of these two treatments. At the 1-year follow-up, the "difference between the groups given lumbar instrumental fusion and cognitive intervention and exercise was neither clinically important nor significant" (p. 1920). Both groups displayed significant clinical improvement in a wide range of measures. These findings were similar to those of Fairbank et al,⁴¹ who reported outcomes at 2 years. Even more recently, Brox et al¹⁷ conducted an randomized, controlled trial demonstrating the effectiveness of CPP with lumbar instrumental fusion in patients with chronic low back pain and who also had a previous surgery for disc herniation. Again, no differences in treatment efficacy were found.

Finally, it should be noted that these cognitive-behavioral perspectives proceed from the view that an individual's interpretation, evaluation, and beliefs about his or her health condition and coping repertoire, with respect to pain and disability, will affect the degree of emotional and physical disability associated with the pain condition.¹⁰⁰ Also, usage of the phrase cognitive-behavioral intervention varies widely and may include self-instructions (eg, distraction, imagery, motivational self-talk), re-

laxation or biofeedback, development of coping strategies (eg, distraction, increasing assertiveness, minimizing of negative or self-defeating thoughts), changing maladaptive beliefs about pain, and goal setting. An individual referred for cognitive-behavioral intervention may be exposed to varying selections of these strategies. A more detailed summary of some of these studies is listed in Table 2. The following are a number of other studies documenting the efficacy of cognitive-behavioral therapy: Astin et al,⁴ Keefe and Caldwell,⁶¹ Bradley,¹⁴ Burns et al,¹⁸ Chen et al,²³ Cutler et al,²⁸ Eccleston et al,³⁶ Spinhoven et al,⁹⁶ and Weydert et al.¹²³

A More Detailed Look at Outcomes

Pain and Quality of Life

As noted earlier, better pain management and restoration of functionality are of primary concern for persons with pain and their families. Published reports indicate that CPPs result in varying degrees of pain reduction, from 14%⁷⁸ to 60%¹⁰¹, to an average of 20% to 30%.⁴³ These figures are comparable to the most conventional medical management of chronic pain with opioids, which yields an average pain reduction of 30%.¹¹⁰

Functional restoration is a primary driving philosophy for many CPPs; even if treatment does not totally eliminate pain, restoring function provides persons with an opportunity to resume productive lives, thereby improving quality of life. Unfortunately, research evaluating pharmacological treatments for chronic pain rarely measures functional ability as a clinical outcome, and, when it does, the results are not very encouraging.⁵ The comparison of the functional outcomes thus has to rely on the results from the meta-analysis⁴³ evaluating CPPs in relation to unimodal, conventional medical care. CPPs clearly excel: Approximately a 65% increase in physical activity is observed following CPP treatments. In contrast, only a 35% increase is reported in patients receiving conventional medical care.

Another important functional outcome is return to work (RTW). Resumption of gainful employment is a major concern in the care of individuals with chronic pain, especially those whose pain began after a work-related injury. CPPs have consistently shown RTW results superior to those of conventional medical therapies. Table 3 presents the results from the past studies assessing RTW following the completion of CPPs, as compared with control patients (generally continuing medical management therapies). RTW rates following CPP range from 29% to 86%, with a mean of 66%, whereas conventional medical treatments consistently yielded lower rates, from 0% to 42%, with a mean rate of 27%. The meta-analysis⁴³ has shown comparable figures for patients with the average of 7-year history of chronic pain.

Although RTW is an "objective" and nonambiguous outcome criterion, it is not a pure clinical variable. A number of socioeconomic factors interact with it, such as regional variation in the job market, availability of job accommodations, marketability of the patient's skills, extent of wage replacement, and financial incentives. Also,

Table 2. Studies Demonstrating the Therapeutic Efficacy of Behavioral and Cognitive-Behavioral Techniques for Treatment of Chronic Pain

AUTHOR/DATE OF PUBLICATION	STUDY SUMMARY
Morley et al, 1999	A literature review of 33 papers from which 25 trials suitable for meta-analysis were identified. The effectiveness of cognitive-behavioral treatment was compared with the waiting list control to alternative treatment control conditions. The cognitive behavioral treatments produced significantly greater changes for pain experience, cognitive coping and appraisal (ie, positive coping measures), and reduced behavioral expression of pain. Active psychological treatments based on the principle of cognitive behavioral therapy are effective.
McCracken & Turk, 2002	Numerous controlled clinical trials of behavioral treatment and cognitive behavioral treatment for chronic pain, alone or more commonly in multidisciplinary treatment contexts, suggest that these treatments are effective. Results of published studies in the scientific literature showed that overall behavioral and cognitive behavioral treatments for chronic pain reduce the patient's pain, distress, and pain behavior and improve daily functioning.
Pincus et al, 2002	A systematic review of prospective cohort studies of low back pain to evaluate evidence implicating psychological factors in the development of chronicity in low back pain. The biopsychosocial model is gaining acceptance as a treatment for low back pain and has provided a basis for guidelines and interventions. Purpose was to evaluate the unique contributions of psychosocial factors in the transition from an acute presentation to chronicity. Results showed that psychosocial factors (especially distress, depressive mood, and somatization) are significantly implicated in the transition to chronic low back pain. Psychosocial factors (which are considered in biopsychosocial interdisciplinary pain management programs) are important in chronic pain patients.
Vlaeyen & Morley, 2005	The lead article of a special topic series on cognitive behavioral treatment for chronic pain: ". . .cognitive behavioral treatment interventions for chronic pain have expanded considerably. It is now well established that these interventions are effective in reducing the enormous suffering that patients with chronic pain have to bear. In addition, these interventions have potential economic benefits in that they appear to be cost-effective, as well" (p.1).
McGrath & Holahan, 2003	A review of data and studies that demonstrate treatment effectiveness of psychological interventions such as cognitive behavioral treatment in reducing chronic pain in children and adolescents.

not only are some patients older than they were at the onset of their pain problems, but years of unemployment might have resulted in considerable mismatch between the patient's job skills and the skills that are required.

Table 3. Return-to-Work Rates

STUDY	COMPREHENSIVE PAIN	
	PROGRAM	CONTROL
Bendix et al, 1996	64	29
Deardorff et al, 1991	48	0
Duckro et al, 1985	71	33
Feuerstein et al, 1993	74	40
Finlayson et al, 1986	65	44
Guck et al, 1985	75	25
Hazard et al, 1989	81	29
Hildebrandt et al, 1997	62	N/A
Mayer et al, 1987a	87	41
Pfingsten et al, 1997	63	N/A
Roberts & Reinhardt, 1980	77	5
Sachs et al, 1990	63	42
Sturgis et al, 1984	29	14
Tollison et al, 1989	56	27
Tollison, 1991	57	20
Tyre et al, 1994	86	N/A
Vendrig et al, 2000	65	N/A
Average	66	27

Healthcare Utilization

The cost of health care continues to rise. Healthcare utilization data from CPP trials generally yield favorable results. For example, researchers found a more than 33% reduction in pain-related clinic visits in the HMO setting in the year following the completion of CPPs with the strong cognitive behavioral orientation.²¹ Several reports^{19,91,101} indicated that 60% to 90% of CPP patients do not seek any additional therapy for pain within 1 year following the treatment. Another study⁷⁰ reported a substantial 50% decline in pain-related clinic visits following a comprehensive rehabilitative treatment.

Earlier reviews^{81,106} reported striking reductions in the subsequent hospitalization and surgical intervention following CPPs. Approximately 16% and 17% of CPP-treated patients receive subsequent surgical therapy and hospitalization, respectively. In contrast, almost half of the conventionally treated patients undergo surgery or would be hospitalized.⁹⁴ Overall, it has been estimated that annual medical costs following a CPP are reduced by 68%.⁹⁴ In the randomized, controlled trial reported by Rivero-Arias et al,⁸⁵ even when compared with traditional interventions such as spine surgery, the long-term treatment outcome results at a 2-year follow-up were comparable but with a significantly reduced economic cost associated with CPPs.

Many patients with chronic pain experience various comorbid disorders. Thus, it should not be surprising to

see polypharmacy issues associated with chronic pain. Annual pharmaceutical costs per patient with chronic pain are not known at this time, but it is not difficult to assume that there is substantial consumption. Medication costs for back pain alone have been estimated to range from \$5,000 to \$10,250 per patient.^{29,99} According to a recent estimate, the sales of analgesics in the United States approximated \$8 billion in 2000, and the value is expected to grow by 10% annually.⁶⁶ It should also be noted that although there have been a number of randomized, double-blind, controlled trials and meta-analyses demonstrating the treatment efficacy of various medications with pain conditions such as neuropathic pain (eg, Cepeda and Farrar²²), these were not direct comparisons with CPPs. Therefore, their relative efficacy cannot be determined. Moreover, in a recent review of clinical trials of opioid analgesics for the treatment of chronic pain, Katz⁶⁰ has highlighted the fact that most of these trials were associated with methodological problems that compromised their integrity and produced conflicting results.

Research considering reduction in medication use has traditionally focused on the use of opioid analgesics. The use of opioids for noncancer chronic pain patients remains a controversial issue. The nature of the debate is beyond the scope of this paper. However, reduction or elimination of opioid medications has frequently been considered an important part of clinical outcome for research investigating the effectiveness of CPPs. Approximately one half of patients take opioid analgesics at the time of an initial evaluation at CPPs.⁴³ Following CPP treatments, more than 65% of these patients discontinued their opioid medications for at least 1 year.¹⁰¹ Subsequently, Tollison¹⁰² reported the striking results from the comparisons of opioid use among individuals who completed a CPP and individuals who were not able to participate in the program because of denial from their third-party payers. The former group showed significant reduction in opioid use, from 69% at the admission to 22% at 1-year follow-up, whereas in the latter group, opioid use remained relatively unchanged, decreasing from 81% to 75%. Thus, there is also a significant cost offset produced by CPPs; cost offset refers to decreases in other healthcare utilization as the result of a particular treatment.

These figures are presented not to dispute the appropriateness of the use of opioid analgesics for patients with noncancer chronic pain. However, the results are rather telling when they are accompanied by significant pain reduction and improvement in functions. From the healthcare economy perspective, helping patients become more efficient in self-management of their pain and disabilities should decrease their reliance on the healthcare system.

Disability Claims

Inability to maintain gainful employment is common in chronic pain. Pain patients whose pain onset began

with work-related injury almost always file for workers compensation benefits. Administrative policies vary by state across the United States, so it is difficult to generalize the trend nationwide. As an example, the Department of Labor and Industry in the state of Minnesota¹⁰ reported a general decline of indemnity per claim cost from 1990 to 1998 and then an upward trend from 1998 to present. As of 2001, it was estimated that the average indemnity cost per claim was \$12,900, and medical benefits per claim were \$11,500. Another report⁴⁵ estimated that up to \$43 billion is spent annually in the United States for disability compensation for back pain alone. Similar to the RTW criterion and healthcare utilization, whether CPP treatment leads to the closure of disability claims has become an important outcome because of the socioeconomic implications of reduced productivity, wage loss, and disability payments.

A substantial number of CPP-treated patients seem to close disability claims after completing the treatment. Painter et al⁸² found that the proportion of the patients receiving disability significantly declined (70% to 45%). For example, approximately 75% of the cases were recommended for closure,⁹¹ and the majority of litigation was settled within 1 year.⁶⁷ The clinical effects of the conventional and surgical interventions on closing disability claims, unfortunately, have not been studied and are thus unknown.

The decision as to whether a claim should be closed is essentially administrative, not clinical. In an ideal situation, the decision should be based on signs and symptoms that are objectively measured. However, claim closure for patients with chronic pain must depend on the patient's self-reports of pain and disabilities, given the subjective nature of the syndrome. The complex nature of chronic pain disorders inevitably makes claim adjusters very important. Of course, case workers and insurers also often seek outside medical opinions as to whether a claimant has reached "maximum medical improvement" as a basis of case closure. Nonetheless, very little is known about the reliability of decision making by case managers on closing disability claims. In addition, societal and organizational pressures to promote closures may also become relevant as financial resources become more constricted. Therefore, careful interpretation is needed to understand the disability closures as a treatment outcome in pain therapy.

Cost-Effectiveness Evaluation

Costs for CPP treatment vary, depending on the settings and level of intensity. Because of the reimbursement pressures, many CPPs have cut back their programs or closed their organized programs. This is quite paradoxical in the light of findings such as those of Rivero-Arias et al⁸⁵ that surgical treatment for chronic low back pain costs more than twice that of a CPP, even though treatment outcomes are comparable at a 2-year follow-

up. The average cost for outpatient CPP has also shown a significant decline. It is estimated that an average outpatient multidisciplinary rehabilitation program cost \$5,075 in 2001.⁶⁶ The data on which this discussion is based were gathered several years ago when CPPs offered more intensive treatment and were thus more costly. The following analysis is based on the (\$8,100) cost estimated in 1995,⁶⁵ which is a more appropriate representation for our analyses.

Healthcare Costs

Annual medical therapy costs, including medications for back pain, are estimated to be \$12,900 to \$19,823.^{7,29,98} As noted earlier, annual medical costs following a CPP are reduced by 68%.⁹⁴ With the assumption of age 45 as the average age at CPP⁴³ and life-expectancy age of 77,⁷⁶ the lifetime healthcare cost per patient can be calculated as follows:

$$\text{CPP: } \$8,100 + (\$12,900 - \$19,823) \times (100\% - 68\%) \times 32 \text{ years} = \$140,190 - \$211,087$$

CPP cost range of annual healthcare cost not reduced

$$\text{Conventional: } (\$12,900 - \$19,823) \times 32 \text{ years} = \$412,800 - \$634,366$$

$$\text{Lifetime saving} = \text{Conventional} - \text{CPP} = \$272,610 - \$423,279$$

This estimate does not account for any increase in healthcare costs. The figures are consistent with previous reports^{81,108,110} that estimated the healthcare saving of \$8,500 to \$8,772 per patient per year following CPP treatment.

Disability

In 2004, a total of 6.2 million disabled workers received \$5.5 billion in Social Security disability bene-

fits (\$10,728 per person⁹⁵). The average age of patients referred to CPPs is 45 years.⁴³ Assuming a retirement age of 65 years, a time-unadjusted total of \$214,560 over 20 years of disability will be incurred per patient. From the literature, 66% of CPP-treated and 27% of conventionally treated patients return to work. Thus, the lifetime disability cost for each treatment per patient is calculated as follows:

$$\text{CPP: } 34\% \times \$10,728 \times 20 \text{ years} = \$72,950$$

$$\text{Conventional: } 73\% \times \$10,728 \times 20 \text{ years} = \$156,628$$

The summary (using the lower-cost figures for the healthcare costs) is shown in Fig 2. Altogether, CPP saves \$356,288 per person over the course of a lifetime for healthcare and disability compared with conventional medical therapy for chronic pain. The savings is, however, the tip of a large iceberg. Numerous other costs have not been included here, such as tax revenue, lost productivity, and sick leaves. Lost productivity in the U.S. workforce is estimated at \$61.2 billion per year.⁹⁷ Need-

less to say, there are also the unmeasurable emotional costs of pain and suffering for patients and their families.

Finally, Hatten et al⁵⁵ recently analyzed the cost-utility (expressed in Cost/Quality – Adjusted Life Years or QALYs) of interdisciplinary treatment for chronic spinal pain. The calculation of QALYs involve the costs of a specific intervention, relative to the desired improvement in health (in this case, increased functioning and decreased pain). Results of this study revealed that rela-

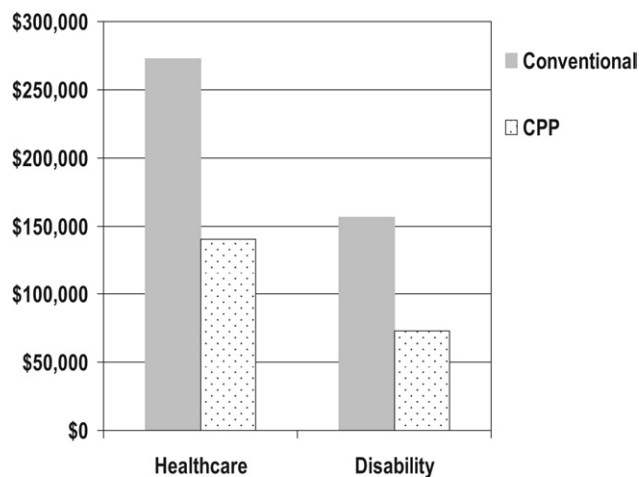


Figure 2. Lifetime healthcare and disability costs following treatment (comprehensive pain program versus medical treatment).

tive to medication treatment with or without anesthetic procedures, the interdisciplinary treatment was associated with a better QALY. Such cost-utility findings indicate that the CPP was both less costly and more effective than the other treatments.

Concluding Comments

Chronic pain is a ubiquitous medical condition. Traditionally, pain has been conceptualized as a symptom reflecting an underlying pathology. Many chronic pain cases, however, fail to fit into such a category, rather manifesting as multisystem illnesses that significantly compromise major parts of the patient's functional life. For these cases, the standard medical approach or medication management does not seem to provide much relief. The only therapeutic approach that has shown efficacy and cost-effectiveness is a CPP, with functional restoration as a primary goal. Indeed, based on the growing number of randomized, controlled trials from different clinical research centers in the United States and other countries, there is unequivocal evidence for the effectiveness of CPPs. There is now more evidence-based research documenting this effectiveness than for any other medical treatment approach.

Given what the scientific literature indicates, the assumption that CPPs are too costly and have no good clinical benefit is quite puzzling. Because CPPs involve multiple professionals in a time-intensive manner, the initial cost for this approach may be higher than that for the conventional medical management approach. However, despite clear evidence of the significant long-term clinical and cost benefits of CPPs and the growing acknowledgment of the central role of outcomes in evidence-based medicine, third-party payers continue to resist reimbursement for the expenses of these rehabilitation programs. The randomized, controlled trial by Rivero-Arias et al⁸⁵ found that even

when compared with a traditional medical intervention such as spine surgery, the long-term treatment outcome results at 2-year follow-up are comparable, but CPPs demonstrated significantly reduced economic cost. This is even more startling because many have questioned the need for spinal fusion surgery.³¹ Furthermore, managed care organizations have been "carving out" portions of comprehensive, integrated programs (ie, sending patients to different providers for their various needs outside of the CPPs), thus diluting the proven successful outcomes of such integrated programs in an effort to cut costs.^{48,62,86} In the long run, however, the program that can help patients resume productive lives is much more cost-effective from the perspectives of healthcare, tax, legal, and general economic factors.

Indeed, a major obstacle to effective CPPs is the lack of understanding of third-party payers who refuse to cover such programs, even though CPPs are known to be beneficial in significantly reducing pain and disability. Efforts of third-party payers to contain costs have paradoxically steered patients away from treatments that demonstrably reduce healthcare utilization and toward more expensive therapies with poorer outcomes. As noted by Turk,¹¹² "Greater collaboration is required among professional groups, consumers of healthcare services, governmental agencies, and third-party payers to ensure that the most clinically effective and cost-effective treatments are provided to all likely to benefit from them" (p. 13). This will be especially important in the immediate future with the "graying" of America. Indeed, persons 50 years and older are twice as likely to have been diagnosed with chronic pain. Epidemiologic projections suggest a chronic pain prevalence of at least 2% of the adult population.¹²⁰ By the year 2030, the U.S. Census Bureau¹¹⁶ projected that about 20% of the population will be 65 years or older. Thus, the survival and continued growth of CPPs will be an important investment for the future health care of senior citizens in the United States.

The misunderstanding of the cost-effectiveness of CPPs often leaves physicians in an impossible situation. Because of the multidimensional, multisystem presentation of chronic pain, they are compelled to become a comprehensive, multidisciplinary pain team by themselves. However, it is unrealistic that a single physician be expected to have a detailed understanding of psychology, physical therapy, occupational therapy, and nursing at the levels sufficient to complete comprehensive assessment and treatment of chronic pain. Nor is it likely to be a cost-effective practice. Consequently, inadequate treatment of persons with pain has been acknowledged to be an epidemic by several important organizations in the United States, resulting in the development of new standards for the evaluation and treatment of pain. The U.S. Department of Veterans Affairs and the Joint Commission on Accreditation of Healthcare Organizations now require that pain be documented as the 5th vital sign (added to the other four of pulse, blood pressure, core temperature, and

respiration). These organizations assert that patients have "a right" to have their pain adequately managed. In 2001, Congress passed and President Clinton signed into law a bill designating the period January 1, 2001, to December 30, 2010, as the "Decade of Pain Control and Research." At this juncture in the decade, great advances have been made in pain management, especially in response to the cry by government and managed care officials to provide them with evidence-based data documenting the outcomes of pain management efficacy.

In conclusion, the available literature documents that CPPs offer the most efficacious treatment for persons with chronic pain. Furthermore, CPPs have been shown to be more cost-effective than conventional medical interventions. These results are particularly impressive, given that many patients have undergone

other treatments without achieving satisfactory outcomes and have come to CPPs as the last resort. If those patients could be referred early or undergo preventive programs, the clinical effectiveness and cost-effectiveness of CPPs probably would yield more improvement. Indeed, the early intervention program conducted by Gatchel et al⁵⁰ clearly demonstrated striking therapeutic effect and cost-effectiveness outcomes for patients with low back pain treated at the acute phase (i.e., less than 3 months since pain onset). A reasonable conclusion, therefore, is that CPPs offer a vital clinical option for persons with chronic, disabling pain problems.

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