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The Effects of Psychosocial Factors on Quality of Life Among Individuals With Chronic Pain

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This study investigated the psychosocial factors affecting the quality of life (QOL) of 171 individuals with chronic pain. Participants completed a battery of self-rated inventories measuring three sets of predictor variables—demographic (age, gender, income, marital status), pain-specific (chronicity, severity, duration, frequency, pain impairment), and psychosocial (interference, social support, depression, coping)—and one criterion variable with five models (physical, psychological, social, environmental, total). Hierarchical multiple regression indicates that income predicts the psychological and environmental domains of QOL. Across all five models, 56% to 76% of the variance was accounted for with the three sets of variables. Demographics remained minimally predictive of all models. Pain impairment was predictive of all five models. Depression was predictive of all but physical QOL, and coping was predictive of all but physical and environmental QOL. The pain impairment variable and the two psychosocial variables (depression and coping) remained imperative in predicting QOL of individuals with chronic pain.

Keywords: *psychosocial factors; quality of life; chronic pain*

Chronic pain is defined by most researchers as pain that lasts for longer than 6 months (International Association for the Study of Pain, 1986; Lindberg & Bluestein, 2002), and it is increasingly being recognized as a significant national and international health care problem. In addition, disability associated with chronic pain has been described as reaching epidemic proportions (International Association for the Study of Pain, 1986; Lindberg & Bluestein, 2002; Mason, Skevington, & Osborn, 2004). The number of persons living with chronic pain in the United States exceeds 75 million, and the prevalence in the general population worldwide is estimated to lie between 5% and 33% (Lindberg & Bluestein, 2002; Mason et al., 2004). Chronic pain may result as a consequence of a large number of chronic physical or neurological conditions and thus represents a complex, often multifactorial etiology, which is frequently unknown (Mason et al., 2004).

The impact of chronic pain on physical, psychological, and psychosocial functioning is as complex and individual as its etiology. As a result, measures that focus exclusively on disease status are increasingly recognized as being insufficient to comprehensively capture information about the wide impact that living with chronic pain has on individuals, and clinicians and researchers have become increasingly interested in the use of multidimensional quality of life (QOL) assessment (Mason et al., 2004). Although QOL research among persons with chronic pain has lagged behind that concerning other chronic conditions, the number of studies exploring the impact of chronic pain on QOL has been steadily increasing over the last several years, and a relatively robust effort is currently underway in this area. For the most part, however, QOL research to date among persons with chronic pain has been based focused almost exclusively on a health-related QOL perspective.

Rehabilitation researchers have consistently highlighted the important role that rehabilitation counselors can play in working with individuals with chronic pain, particularly among injured workers. Habeck, Kress, Scully, and Kirchner (1994) indicated that claims in the workplace had shifted from acute injuries to chronic illnesses,

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including chronic pain and stress adjustment. The knowledge and skills of rehabilitation counselors in psychosocial conceptualization and treatment, personal adjustment counseling, and vocational counseling make rehabilitation counselors uniquely suited to work with this population. For instance, Beck and Lustig (1990) discussed the important role of rehabilitation counseling within the context of management of chronic pain and how rehabilitation counseling services are crucial in helping this population regain productive lifestyles and employment. Reagles (1984) indicated that rehabilitation counselors are equipped to identify the physical, psychosocial, and environmental factors affecting the function of individuals with chronic pain, and they provided intervention strategies to reduce impairment and modify the pain behavior. Similarly, Tuck (1983) indicated that rehabilitation counselors have a valid and vital role as a member of a multidisciplinary pain management team, especially in the area of return to work (e.g., career counseling, job exploration, job analysis, work modification).

Attention to the interplay of vocational and interpersonal concerns has been identified as being imperative in the general rehabilitation counseling literature (Perrone, Perrone, Chan & Thomas, 2000) and in workers' compensation rehabilitation (Lui, Chan, Kwok, & Thorson, 1999). Furthermore, there is empirical evidence that rehabilitation outcomes and return-to-work issues are often hindered by other psychosocial issues, such as stress management. For instance, Cutler, Fishbain, Steele-Rosomoff, and Rosomoff (2003) conducted a study to investigate the relationships of functional capacity measures and psychological measures in a group of individuals with chronic pain. Results indicated that pain level and compensation status were the primary predictors of functional capacity and employment status. Specifically, the authors indicated that return to work was affected by the functional and pain levels of individuals with chronic pain. Similarly, Burton, Polatin, and Gatchel (1997) conducted a study on individuals with chronic work-related upper-extremity disorders in terms of important psychosocial factors in long-term employment outcome. With the results that being older, being a Caucasian, having an anxiety disorder, and having a negative perception of the disability predicted a lower return-to-work rate, the authors discussed that the combination of assessment and treatment for psychosocial dysfunctions with other rehabilitation services are imperative in promoting long-term employment success. Finally, Dozois, Dobson, Wong, Hughes and Long (1995) investigated the factors related to rehabilitation outcome and employment outcome with a group of 117 male workers with low back pain. The authors indicated that psychological factors at admission were salient variables that predicted employment outcome whereas among the treatment variables, physical status and clients' perception of disability predicted return to work. Therefore, consistent with rehabilitation philosophy and practice, rehabilitation counselors should be cognizant of the holistic perspective and psychosocial factors that affect injured workers' adjustment, which also have an effect of successful employment outcome.

QOL has become a key component of rehabilitation counseling philosophy and practice and an increasingly important aspect of effective practice with persons with chronic pain. QOL has become one of the most important outcomes in health care and rehabilitation (Elliott, Renier, & Palcher, 2003; Fallowfield, 1990; Mason et al., 2004). Numerous studies have occurred over the past two decades investigating the mechanisms by which various diseases and chronic conditions affect QOL. These investigations have generally been conducted for the purpose of evaluating treatment and intervention effects or as a means to identify individual service and treatment needs.

Operational Definition of QOL

General QOL

The operational definition for the construct of general QOL is a subject of vigorous debate. The conceptual framework and operational definitions of QOL are quite diverse, with a variety of terms being equated with the construct, such as *life satisfaction*, *well-being*, *health*, *happiness*, *adjustment*, *functional status*, *health status*, and *value of life* (Frank-Stromborg, 1988; Frish, 1999). Moreover, the conceptualization of QOL is continually changing in breadth and depth because it is increasingly being refined for specific purposes. For example, the frequently cited World Health Organization definition of QOL suggests that the construct incorporates "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" (Billington, 1999, p. 3). Thus, from the World Health Organization perspective, QOL is a broad concept that incorporates a person's perception of his or her physical health, psychological state, level of independence, social relationships, personal values and beliefs, and interaction with the environment (Chandra & Ozturk, 2005).

Health-Related QOL

QOL has also been conceptualized and measured with more narrow and specific foci; for example, health-related

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QOL (HRQOL), which has received significant attention in medicine and allied health fields, represents a subset of overall QOL and includes those aspects of QOL that are directly related to an individual's health and perhaps the target of clinical intervention. HRQOL is often confused with traditional health status measures; however, the primary (although sometimes blurred) distinction between the two is that the latter evaluates objective health status and the former involves a comprehensive assessment of the individual's objective health status and subjective assessment of well-being.

Typically, HRQOL instruments assess the impact of functional status on QOL through multiple domains. For example, the *Medical Outcome Study Short Form–36* (SF-36; Ware & Sherbourne, 1992) assesses the following eight domains: limitations in physical activities because of health problems, limitations in social activities because of physical or emotional problems, limitations in usual role activities because of physical health problems, bodily pain, general mental health (psychological distress and well-being), limitations in usual role activities because of emotional problems, vitality (energy and fatigue), and general health perceptions. Assessment with this more focused approach to QOL typically measures individuals' perceptions of daily functioning and well-being in physical, social, and psychological domains (Elliott et al., 2003; Vickrey, Hays, Hermann, Bladin, & Batzel, 1993). Despite attempts at clarifying these overlapping concepts, confusion remains because health status measures, such as those measuring HRQOL and QOL, are generally multidimensional and frequently include domains that overlap accepted HRQOL domains.

One way to differentiate between these constructs is to consider the weak relationship between health status and QOL. Poor health status and significant disability appear to be, to a great extent, unrelated to reported QOL (Johnson, Amtmann, Yorkston, Klasner, & Kuehn, 2004). An explanation for this finding is that health represents only one of the many components that people consider when evaluating their QOL. Moreover, the effects of health on QOL may vary because of age and health status, wherein health appears to be less important when it is good and more important when it is not good or in danger of becoming worse (e.g., Campbell, Converse, & Rogers, 1976; Flanagan, 1978). According to Anderson and Burckhardt (1999) "considerable support exists for dispensing with the notion that health is synonymous with quality of life" (p. 303). Thus, an increasingly accepted tenet of outcome measurement is that assessment of health status and multidimensional subjective QOL are necessary in the evaluation of clinical care, intervention, and disability functioning.

QOL in Chronic Pain

In the area of chronic pain, QOL research evidence appears to have been slow in developing, relative to other chronic conditions, but the number of focused investigations has been steadily increasing over the last several years. Results of investigations of some elements of the pain–QOL relationship are further described below, but in general, the research suggests that individuals who are experiencing chronic pain tend to report relatively lower HRQOL, lower overall QOL, and higher psychological distress than do persons without chronic pain. For instance, Hopman-Rock, Kraaimaat, and Bijisma (1997) studied QOL among elderly people with hip or knee pain and found that this group reported lower QOL as compared to a control group. Becker and colleagues (1997) found that individuals with chronic pain reported having lower HRQOL and higher depression. Lame, Peters, Vlaeyen, Kleef, and Patijn (2005) found that persons with chronic pain had a lower QOL, especially those with lower back pain and multiple pain localizations. Similarly, E. M. Smith, Gomm, and Dickens (2003) studied the relationship among various psychosocial variables and found that anxiety and depression were associated with global health status, emotional and cognitive functioning, and fatigue in a group of chronic pain individuals. Munoz et al. (2005) reported a relationship between pain severity, depressive symptomatology, and reduced QOL among a group of outpatients in Latin America.

QOL and the Pain Variable

The type, location, and severity of pain have been explored in a number of studies for their relationship to QOL. In general, the strength of the various pain variables relating to QOL in the chronic pain population varied, with r values ranging from .13 to .59 and an average correlation coefficient of .35. Specifically, results indicate that the pain variable is a somewhat important factor in affecting the QOL of individuals with chronic pain, and studies have shown that pain-related variables such pain severity, pain chronicity, and pain impairment directly or indirectly affect QOL (Abresch, Carter, Jensen, & Kilmer, 2002; Becker et al., 1997; Hitchcock, Ferrell, & McCaffery, 1994; Hopman-Rock et al., 1997; Hwang, Chang, & Kasimis, 2002; Munoz et al., 2005; Petrak, Hardt, Kappis, Nickel, & Egle, 2003; Ward, Carlson-Dakes, Huges, Kwekkeboom, & Donovan, 1998). For instance, Hitchcock et al. (1994) reported that in their survey of 204 persons with chronic nonmalignant pain, approximately half the sample (46%) reported back pain as the most bothersome type of pain. Abresch et al.

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(2002) conducted a study on pain and HRQOL in a group of individuals with neuromuscular disease who experienced pain. Results supported that there are significant correlations between bodily pain and each of the HRQOL domains measured by the SF-36—namely, impact on physical functioning; impact on work or other daily activities; role functioning–emotional; impact of emotional problems with social activities; bodily pain, intensity of pain and effect of pain on work; mental health; vitality, feeling energetic; and general health perception. A moderate correlation was found between bodily pain and global satisfaction of general health.

QOL, Coping Style, and Psychosocial Variables

Coping style and psychosocial factors such as social support, depression, and interference in daily activities have been shown to predict and/or mediate QOL among this population. Based on the comprehensive literature described in this article, a general trend was observed in terms of strength of those variables related to QOL. Specifically, among the four variables mentioned, correlation coefficients between coping skills and QOL ranged from .20 to .66. In general, correlation coefficients between mental health (e.g., depression) and QOL ranged from .24 to .64. For interference, correlation coefficients generally ranged from .15 to .56. Social support, however, showed a weaker trend in terms of its strength with QOL among the literature reviewed, with *r* values ranging from .20 to .35. Petrak et al. (2003) indicated that coping styles—especially, increasing pain behaviors and catastrophizing—have a major impact in terms of individuals' perception of impairment and, thus, a detrimental effect on their health-related QOL. The researchers found that increasing pain behaviors and catastrophizing accounted for 20% and 22% of the variance in HRQOL, respectively. In Ward and colleagues' study (1998) on the impact of QOL of individuals' barriers to pain treatment, regression analysis indicated that beliefs were significantly related to use of analgesia to control pain symptoms and to ineffective coping styles. Similarly, Lame et al. (2005) found that the coping style catastrophizing was the most important predictor of QOL, especially for predicting social functioning, vitality, mental health, and general health.

The purpose of this article is to further this area of research by investigating factors influencing the QOL of persons with chronic pain. Because much of the research in the area of QOL and chronic pain has been based on a HRQOL perspective, this study examined a comprehensive QOL perspective. The present research is based on a review of the existing literature concerning the factors related to QOL in chronic pain and the strength of such variables in relating to QOL. Given the research, we explored the relationships and contributions of demographic, pain, and psychosocial variables to four domains of QOL.

Method

Participants

Participants included 171 rehabilitation clients recruited from six outpatient facilities that provide pain rehabilitation intervention for clients who are receiving workers' compensation and living predominantly in Alberta, Canada. A total of 223 packets were given out across the facilities, with 171 packets completed and returned, for a response rate of 76.7%. To be included in the study, clients had to be 21 years or older and had to carry a medical diagnosis of nonmalignant work-related pain for at least 6 months or more based on the criteria for chronicity specified by the International Association for the Study of Pain (1986). The sample consisted of 87 men (50.9%) and 84 women (49.1%); the mean age was 42.5 years (*SD* = 9.9), and 62.6% were married or living with a partner. Participants were primarily Canadians of European decent (71.3%) who had a high school or vocational technical school education (91.2%). The majority of the participants identified their socioeconomic status as lower-middle class (39.8%) to middle class (45.6%). The types of injuries among the participants were back injury (64.3%), upper-extremity and lower-extremity injury (31.0%), and mild head trauma with orthopedic pain (1.2%); the average time since injury onset was 26.1 months (*SD* = 51.8). The primary occupational categories of the participants were construction, transportation, manufacturing, janitorial, health care, mechanical, and services, representing jobs requiring a range of physical demand characteristics.

Predictor Measures

Three sets of predictor variables were added to the model in blocks, in the following order: demographic variables, pain-related variables, and psychosocial variables. The first group of consisted of four variables, all of which were obtained from the demographic section of the survey: age, gender, income, and marital status. Age and income were continuous data, whereas gender and marital status were dichotomous data coded as dummy variables. The second group consisted of five pain-related variables, all of which were continuous data: chronicity, severity, duration, frequency, and pain impairment. The

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third group of predictor variables consisted of four psychosocial variables, all of which were continuous data: depression, social support, coping, and interference.

Pain. One demographic item captured the pain chronicity aspect of the pain variable. Respondents were asked about their onset of the injury and pain in terms of months and years. Pain severity was measured by the *Visual Analogue Scale* (VAS), whereas the remaining three pain aspects (duration, frequency, and impairment) were measured by subdomains of the *Medical Outcome Study–Pain Severity Subscale* (MOS-PS; Sherbourne, 1992).

The VAS measures subjective pain in clinical settings (Ahles, Ruckdeschel, & Blanchard, 1984; Price, McGrath, Rafii, & Buckingham, 1983; Scott & Huskisson, 1976) by asking respondents to record their perceptions of pain on a 100-mm horizontal line. The left end of the line is anchored with *no pain at all*, and the right end of the line is anchored *intense/worst pain*. Respondents are asked to draw a perpendicular line intersecting the horizontal line, indicating their perceived intensity of the average pain experienced for the past week. The number of millimeters from the left extreme to the point where the perpendicular line intersects the horizontal line is recorded as the VAS score, with scores ranging from 0 to 100 and higher scores indicating greater intensity of perceived pain. Test–retest reliability estimates over different intervals have ranged from .60 to .97 (Ahles et al., 1984; Price et al., 1983; Scott & Huskisson, 1976).

The MOS-PS comprises 12 items, with three subscales measuring the following factors: pain frequency, pain duration, and pain impairment. Pain frequency and pain duration are measured via a 5-point Likert-type scale—for example, for pain frequency, how often pain or discomfort has been experienced over the past 4 weeks (1 = *once or twice*, 5 = *every day or almost every day*) and for pain duration, how long pain usually lasts when experienced (1 = *a few minutes*, 5 = *more than two days*). However, for pain impairment, we have to do a *z* score transformation to obtain the subscale score. Sherbourne (1992) reported an internal consistency estimate of .86 for MOS-PS scores. The reliability estimates for these scores for this sample were .74.

Depression. The *Center for Epidemiologic Studies–Depression Scale* (CES-D; Radloff, 1977) was used to measure depression. The CES-D measures depressive symptomatology in the general population and consists of 20 items that measures “feelings/behavior during the past week” (e.g., “I felt that I could not shake off the blues even with help from my family or friends”). Each item is rated on a 4-point Likert-type scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*), and responses are summed over the 20 items to produce a CES-D total score, which ranges from 0 to 60, with higher scores indicating more depression. Radloff reported internal consistency estimates ranging from .84 to .90, and Turner and McLean (1989) found an estimate of .88, when used with a sample of persons with physical disabilities. The internal consistency reliability estimate for this sample was .90.

Social support. The *Social Support Index* (SSI; McCubbin, Patterson, & Glynn, 1982) was used to measure the perceived availability of social support. The SSI is composed of 17 items (e.g., “If I had an emergency, even people I do not know in this community would be willing to help”), with each item rated on a 5-point Likert-type scale from 0 (*strongly disagree*) to 4 (*strongly agree*). Scores are summed to produce a total score ranging from 0 to 68. McCubbin et al. (1982) reported an internal consistency reliability estimate of .82 and a test–retest reliability estimate of .83. For this study, an internal consistency estimate of .90 was found.

Coping. The *Coping Strategies Questionnaire* CSQ (Rosentiel & Keefe, 1983) measures coping strategies used by people with chronic pain. The CSQ is composed of 42 items with seven subscales: diverting attention (e.g., “I try to think of something pleasant”), reinterpreting pain sensation (e.g., “I try to feel distant from the pain, almost as if the pain was in somebody else’s body”), coping self-statement (e.g., “I tell myself to be brave and carry on despite the pain”), ignoring sensations (e.g., “I don’t think about the pain”), praying/hoping (e.g., “I pray to God it won’t last long”), increasing behavioral activities (e.g., “I leave the house and do something, such as going to the movies or shopping”), and catastrophizing (e.g., “I feel I can’t stand it anymore”). The items are rated on a 7-point Likert-type scale from 0 (*never do that*) to 6 (*always do that*), with scores on each subscale ranging from 0 to 36. A reverse score is applied to the last subscale (catastrophizing) so that a lower score indicates a less catastrophic way of coping, thus contributing to a more adaptive coping score as a whole. Therefore, a total coping score was derived for this study and is based on the sum of the scores for each of the seven subscales. Internal consistency estimates for the CSQ subscales have been reported to range from .57 to .89 (Gil, Abrams, Phillips, & Keefe, 1989; Keefe et al., 1987). The internal coefficient estimate for the total score for this sample was .75 to .87.

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Interferences. The *West Haven–Yale Multidimensional Pain Inventory–Interference Subscale* (WHYMPI-I; Kerns, Turk, & Rudy, 1985) was used to measure the types and levels of hindrance of one's daily routines and activities as a result of the pain condition. The WHYMPI-I consists of nine items (e.g., "In general, how much does your pain problem interfere with your day-to-day activities?"). Each item is rated on a 7-point scale ranging from 0 (*none*) to 6 (*extreme*), and scores are summed across items to produce a WHYMPI-I total score ranging from 0 to 54. Kerns et al. (1985) reported an internal consistency reliability estimate of .90 for this score, with a test–retest reliability estimate over a 2-week interval of .86. For this sample, an internal consistency estimate of .89 was found.

Criterion Variable

QOL. The *World Health Organization Quality of Life–Brief Version* (WHOQOL-BREF; WHOQOL Group, 1995, 1998a, 1998b) was used to measure the participants' QOL in terms of their positions in life in the context of their culture and value systems and in relation to their goals, expectations, standards, and concerns. The WHOQOL-BREF is composed of 26 items with four subscales: physical (e.g., "To what extent do you feel that physical pain prevents you from doing what you need to do?"), psychological (e.g., "How often do you have negative feelings, i.e. blue mood, despair, depression?"), social (e.g., "How satisfied are you with the support you get from your friends?"), and environmental (e.g., "How healthy is your physical environment?). The items are rated on a 5-point Likert-type scale from 1 to 5; descriptors vary per individual item (e.g., the anchors of the first example are *not at all* and *very much*). For the original version, the internal consistency reliability estimate exceeds .80, with test–retest reliabilities of .83 (physical), .84 (psychological), .96 (independence), .88 (social), .92 (environment), and .86 (spiritual). Furthermore, the original version has demonstrated convergent and discriminant validity with the SF-36 and the *Subjective Quality of Life Profile*; correlations between the original and the SF-36 and the *Subjective Quality of Life Profile* are reported to be moderate, with Pearson's *r*s of .45 and higher (WHOQOL Group, 1995, 1998a, 1998b). Validity and reliability of the WHOQOL-BREF have also been demonstrated. For example, Skevington, Lotfy, and O'Connell (2004) conducted a study investigating the WHOQOL-BREF across 23 countries ($N = 11{,}830$) over the general population and that in health care facilities (rehabilitation centers, hospitals) and indicated that the measure demonstrates good psychometrics.

In fact, the WHOQOL-BREF has consistently demonstrated strong psychometric properties when applied across cultures. Trompenaars, Masthoff, Van Heck, Hodiamont, and De Vries's study (2005) demonstrated good construct validity vis-à-vis the *Symptoms Checklist-90* and decent internal consistency, with Cronbach alphas ranging from .66 to .80 in a Dutch population. Min et al. (2002) reported good content validity, criterion validity, discriminant validity, test–retest reliability, and internal consistency among groups of healthy community members and people with physical and mental disabilities in Korea. Hao, Fang, and Power (2006) used multigroup confirmatory factor analysis to investigate the equivalence of the WHOQOL-BREF across 13 different country versions. The four-factor structure remains valid in all 13 countries. All Cronbach alphas remain at least .70 and above. The reliability estimates for this sample ranged from .43 to .86.

Procedure

Research approval was secured from each participating facility, and participants were recruited by the first author or by staff psychologists at each facility. A script was provided to facilitate consistency in recruitment and distribution of instrument packets to participants. Packets included a brief cover letter explaining the study, an informed consent form, and a 14-page questionnaire divided into sections for the various measures. Participation time was estimated at 45 to 60 min, and participants were given the option of completing the survey on-site or taking it home to complete within 3 to 4 days, with a stamped return envelope provided.

Data Analysis

Hierarchical multiple regression procedures were used to examine the predictive strength of selected demographic variables (age, gender, income, marital status), pain-specific variables (chronicity, severity, frequency, duration, impairment), and psychosocial variables (depression, social support, coping, interference of pain in daily activities) on the four domains of QOL (psychological, social relations, physical, environmental) in addition to the total QOL domain. Hierarchical regression is used when the contribution of each set of variables is theoretically linked to the other variables in the model. Thus, the order in which the variables are input into the model are prespecified. In this study, five hierarchical regression analyses were performed with each domain of QOL regressed on three sets of variables. The predictors were input into each model in the following order: first, demographic variables; second, demographic and perceived pain variables; third, demographic, perceived pain, and psychosocial variables. Of interest within each set of variables

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Table 1
Correlations of Variables in Full Model

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	1.0																	
2. Gender	.03	1.0																
3. Income	.07	.01	1.0															
4. Marital status	.08	.05	.19*	1.0														
5. Impairment	–.05	.00	–.23**	.10	1.0													
6. Duration	.13	.11	.21**	.19*	.36**	1.0												
7. Frequency	.12	.12	.04	.01	.28**	.31**	1.0											
8. Severity	.04	.11	.10	.12	.11	.13	.26**	1.0										
9. Chronicity	.24**	.02	.17*	.05	–.00	.13	.14	.03	1.0									
10. Depression	–.06	.02	–.32**	–.04	.60**	.04	.15*	.24**	–.11	1.0								
11. Social support	.11	.13	.20**	.01	–.11	.05	.04	.01	.08	–.31**	1.0							
12. Coping	.03	.21**	.04	.08	–.18*	–.12	–.08	.29**	–.02	–.02	.24**	1.0						
13. Interference	.16	.03	–.22**	.09	.75**	.30**	.25**	.14	–.05	.56**	–.09	–.09	1.0					
14. Psychological	.02	–.01	.31**	.10	–.54**	–.03	–.18*	–.04	.07	–.82**	.37**	.26**	–.48**	1.0				
15. Social	.05	.17*	.21**	.10	–.38**	.01	.02	–.07	.07	–.64**	.40**	.31**	–.45**	.68**	1.0			
16. Physical	–.06	–.09	.31**	–.06	–.76**	–.45**	–.31**	–.16*	–.06	–.56**	.10	.14	–.76**	.49**	.40**	1.0		
17. Environmental	.12	.12	.32**	.08	–.44**	–.06	–.07	–.13	.19*	–.68**	.21**	.14	–.46**	.72**	.62**	.52**	1.0	
18. Total	.05	.02	.23**	.07	–.50**	–.18*	–.18*	–.13	.10	–.72**	.25**	.27**	.48**	.82**	.71**	.58**	.88**	1.0

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

are the significant variables in the current step after controlling for the effect of the previous step. We hypothesized that perceived pain would contribute significantly to the variance in each domain of QOL and beyond that of demographic factors and that psychosocial factors would contribute significantly to each domain of QOL above and beyond that of demographics and pain-related variables.

Tests for significant incremental changes in the R^2 statistic were performed at each step. In the event of significant changes, *t* tests were performed for the individual predictors within the set to determine their unique contribution. Statistical significance was .05 for the sets and .004 for individual predictors. The latter was determined using Bonferroni's test, which controls for Type I error among comparisons by dividing alpha by the number of comparisons (.05/14 = .004). Sample size was based on Cohen's power analysis (Cohen, 1988), which allowed for interpretation of the sets as well as the individual predictors. The population effect size (f^2) estimated for individual predictors was set at .15, power at .80, and alpha at .05, which resulted in a sample size of 164.

Results

Table 1 presents overall results from the zero-order correlation analyses for the study variables, and Table 2 presents results from the hierarchical regression analyses. The latter table is the focal point around which the following sections revolve.

Overall QOL

Regarding total QOL, for the first step, the combined demographic variables contributed significantly to the prediction of QOL scores, $R^2 = .06$, $F(4, 166) = 2.42$, $p = .05$. Of the four predictors in this set, income contributed significantly to QOL scores, $\beta = .226$, $t = 2.93$, $p = .004$, suggesting that higher income predicts better QOL. In the second step, when perceived pain variables were added to the model, pain significantly augmented the equation, $R^2 = .29$, $\Delta R^2 = .23$, $\Delta F(5, 161) = 10.56$, $p < .0005$. Of the five pain predictors in this set, perceived pain impairment contributed significantly to QOL scores, $\beta = –.435$, $t = –5.571$, $p < .0005$, suggesting that increased pain impairment predicts lower QOL. For the third step, when psychosocial variables were added to the model, the psychosocial factors significantly augmented the equation, $R^2 = .61$, $\Delta R^2 = .32$, $\Delta F(4, 157) = 32.19$, $p < .0005$. Of the four psychosocial variables, depression and coping contributed significantly to QOL scores: for depression, $\beta = –.712$, $t = –9.753$, $p < .0005$, suggesting that lower depression scores predict better QOL; for coping, $\beta = .257$, $t = 4.472$, $p < .0005$, suggesting higher coping scores predict better QOL.

Psychological Domain of QOL

Regarding the psychological domain of QOL, for the first step, the combined demographic variables contributed significantly to the prediction of psychological QOL scores, $R^2 = .09$, $F(4, 164) = 4.52$, $p = .002$. Of the four predictors in this set, income contributed significantly to

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Table 2
Summary of Hierarchical Regression for Variables Predicting Quality of Life

	Total		Psychological		Social		Physical		Environmental	
Predictors	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	$.06^{*}$ (R^2)		$.09^{**}$ (R^2)		$.07^{*}$ (R^2)		.03 (R^2)		$.12^{***}$ (R^2)	
Demographics										
Age		.03		–.01		.02		–.06		.08
Gender		.02		–.02		.16		–.09		.11
Marital status		.02		.05		.05		–.07		.00
Income		$.23^{**}$		$.30^{***}$		.19		.12		$.31^{***}$
Step 2	$.23^{***}$		$.26^{***}$		$.14^{***}$		$.60^{***}$		$.18^{***}$	
Demographics										
Age		.01		–.04		–.02		–.04		.03
Gender		.03		–.02		.14		–.05		.14
Marital status		.10		.12		.10		.05		.07
Income		.12		.13		.07		–.03		.20
Pain										
Pain impairment		$–.44^{***}$		$–.54^{***}$		$–.41^{***}$		$–.70^{***}$		$–.40^{***}$
Pain duration		–.06		.14		.08		$–.17^{***}$		–.01
Pain frequency		–.04		–.09		.10		–.04		.05
Pain chronicity		.08		.01		.03		.05		.13
Perception of pain		–.09		.01		–.09		–.05		–.11
Step 3	$.32^{***}$		$.25^{***}$		$.35^{***}$		$.10^{***}$		$.26^{***}$	
Demographics										
Age		.03		–.04		.04		.06		.07
Gender		.01		.05		.12		–.05		.14
Marital status		.04		.03		.05		.04		.03
Income		.04		.01		–.06		–.08		.10
Pain										
Pain impairment		.12		–.01		.22		$–.28^{***}$		.08
Pain duration		$–.14^{*}$		.02		.04		$–.19^{***}$		–.08
Pain frequency		–.01		–.06		.11		–.03		.07
Pain chronicity		.02		–.01		–.03		–.10		.05
Perception of pain		–.02		.12		–.09		.00		.00
Psychosocial										
Depression		$–.71^{***}$		$–.81^{***}$		$–.58^{***}$		–.18		$–.59^{***}$
Social support		–.04		.08		.16		.01		.04
Coping		$.26^{***}$		$.20^{***}$		$.24^{***}$		.04		.14
Interference		–.11		.00		–.31		$–.43^{***}$		–.21
Total R^2	$.61^{***}$		$.61^{***}$		$.57^{***}$		$.73^{***}$		$.56^{***}$	

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

psychological QOL scores, $\beta = .303$, $t = 4.01$, $p < .0005$, suggesting that higher income predicts better psychological QOL. In the second step, when perceived pain variables were added to the model, pain significantly augmented the equation, $R^2 = .36$, $\Delta R^2 = .26$, $\Delta F(5, 159) = 12.62$, $p < .0005$. Of the five pain predictors in this set, perceived pain impairment contributed significantly to psychological QOL scores, $\beta = –.54$, $t = –7.29$, $p < .0005$, suggesting that increased pain impairment predicts lower psychological QOL. For the third step, when psychosocial variables were added to the model, the psychosocial factors significantly augmented the equation, $R^2 = .61$, $\Delta R^2 = .25$, $\Delta F(4, 155) = 65.67$, $p < .0005$. Of the four psychosocial variables, depression and coping contributed significantly to psychological QOL scores: for depression, $\beta = –.805$, $t = –13.86$, $p < .0005$, suggesting that lower depression scores predict better psychological QOL; for coping, $\beta = .196$, $t = 4.36$, $p < .0005$ suggesting that higher coping scores predict better psychological QOL.

Social Relations Domain of QOL

Regarding the social relations domain of QOL, for the first step, the combined demographic variables contributed significantly to the prediction of social relations

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QOL scores, $R^2 = .07$, $F(4, 156) = 3.12$, $p = .02$. None of the four predictors in this set were significantly related to social relations QOL scores. In the second step, when perceived pain variables were added to the model, pain significantly augmented the equation, $R^2 = .22$, $\Delta R^2 = .14$, $\Delta F(5, 151) = 5.43$, $p < .0005$. Of the five pain predictors in this set, perceived pain impairment contributed significantly to social relations QOL scores, $\beta = -.413$, $t = -4.90$, $p < .0005$, suggesting that increased pain impairment predicts lower social relations QOL. For the third step, when psychosocial variables were added to the model, the psychosocial factors significantly augmented the equation, $R^2 = .57$, $\Delta R^2 = .35$, $\Delta F(4, 147) = 30.26$, $p < .0005$. Of the four psychosocial predictors in this set, depression, coping, and interference contributed significantly to social relations QOL scores: for depression, $\beta = -.577$, $t = -7.22$, $p < .0005$, suggesting that lower depression scores predict better social relations QOL; for coping, $\beta = .236$, $t = 3.83$, $p < .0005$, suggesting higher coping scores predict better social relations QOL; for interference, $\beta = -.305$, $t = -3.40$, $p = .001$, suggesting lower interference scores predict better social relations QOL.

Physical Domain of QOL

Regarding the physical domain of QOL, for the first step, the combined demographic variables did not contribute significantly to the prediction of physical QOL scores; therefore, the individual predictors were not interpreted. In the second step, when perceived pain variables were added to the model, pain significantly augmented the equation, $R^2 = .63$, $\Delta R^2 = .60$, $\Delta F(5, 158) = 51.62$, $p < .0005$. Of the five pain predictors in this set, perceived pain impairment and pain duration contributed significantly to physical QOL scores: for pain impairment, $\beta = -.697$, $t = -12.33$, $p < .0005$, suggesting that increased pain impairment predicts lower physical QOL; for pain duration, $\beta = -.170$, $t = -3.00$, $p = .003$, suggesting that increased pain duration predicts lower physical QOL. For the third step, when psychosocial variables were added to the model, the psychosocial factors significantly augmented the equation, $R^2 = .73$, $\Delta R^2 = .10$, $\Delta F(4, 154) = 14.30$, $p < .0005$. Of the four psychosocial predictors in this set, only interference contributed significantly to physical QOL scores, $\beta = -.425$, $t = -6.15$, $p < .0005$, suggesting that higher interference scores predict lower physical QOL.

Environmental Domain of QOL

Regarding the environmental domain of QOL, for the first step, the combined demographic variables contributed significantly to the prediction of environmental QOL scores, $R^2 = .12$, $F(4, 157) = 5.42$, $p < .0005$. Of the four predictors in this set, income contributed significantly to environmental QOL scores, $\beta = .309$, $t = 4.04$, $p < .0005$, suggesting that higher income predicts better environmental QOL. In the second step, when perceived pain variables were added to the model, pain significantly augmented the equation, $R^2 = .30$, $\Delta R^2 = .18$, $\Delta F(5, 152) = 7.90$, $p < .0005$. Of the five pain predictors in this set, perceived pain impairment contributed significantly to environmental QOL scores, $\beta = -.401$, $t = -4.97$, $p < .0005$, suggesting that increased pain impairment predicts lower environmental QOL. For the third step, when psychosocial variables were added to the model, the psychosocial factors significantly augmented the equation, $R^2 = .56$, $\Delta R^2 = .26$, $\Delta F(4, 148) = 22.04$, $p < .0005$. Of the four psychosocial predictors in this set, depression contributed significantly to environmental QOL, $\beta = -.592$, $t = -7.66$, $p < .0005$, suggesting that lower depression scores predict better environmental QOL scores.

Discussion

Effects and Comparisons Among the Models

In this study, we looked at five regression models to determine the amount of variance accounted for by demographic, pain, and psychosocial variables in five domains of QOL, including psychological, social, physical, environmental, and total QOL. Overall, the results show that in each model, after all three sets of variables were input, the variables significantly influenced the overall QOL score. Specifically, in the total QOL model, 61% of the variance was accounted for when all three sets were put into the regression equation. In the four other models, the variance that was accounted for in QOL ranged from 56% to 76%: environmental, 56%; social relations, 57%; physical, 73%; and psychological, 76%. These results are consistent with prior studies that found significant relationships between QOL and various demographic, pain, and psychosocial variables among individuals with chronic pain (e.g., Becker et al., 1997; Hopman-Rock et al., 1997; Hwang et al., 2002; Lame et al., 2005; Munoz et al., 2005; Petrak et al., 2003; Smith et al., 2003; Ward et al., 1998).

Of particular interest is the change in variance accounted for in QOL upon the addition of each set of variables. Specifically, the demographic variables (age, gender, income, marital status) contributed minimally to the variance in QOL across all domains, suggesting that demographics may play a limited role in predicting the QOL of individuals with chronic pain.

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The literature regarding the role of demographic variables in QOL is equivocal; therefore, findings from this study are inconclusive (e.g., Boyle et al., 2004; Widar, Ahlström, & Ek, 2004). For instance, Widar et al. (2004) reported that men with chronic pain have lower QOL, particularly in the domain of vitality, as compared to women. Widar et al. also reported that older-age groups have decreased physical functioning as measured by SF-36. Alternatively, Boyle et al. (2004) reported that younger age groups (age 36 to 65 years) experience greater limitations in activities of daily living, a decrease in work performance and other physical activities, as well as an increase in bodily pain, deterioration of health, and severe impairment to social and recreational aspects of life. Similarly, Gerstle, All, and Wallace (2001) reported a higher QOL for participants who were older, female, and employed, whereas a lower QOL was associated with participants with lower incomes, higher treatment costs, and no workers' compensation insurance. In this study, age may not have predicted QOL because the sample did not have an even distribution of age ranges. Furthermore, gender and income did not differentiate the level of QOL in this study. Finally, treatment cost and workers' compensation variables in this study were homogenous, thus precluding the test of this effect of QOL.

When pain-related variables (pain impairment, duration, frequency, chronicity, severity) were added to the equation, the change in variance in QOL across all domains increased significantly, ranging from 14% to 60%—specifically, total QOL, 23%; psychological, 26%; social, 14%; physical, 60%; environmental, 18%. With the exception of physical QOL, the psychosocial variables (depression, interference, coping, social support) contributed significantly and substantially to the variance in QOL. Specifically, when the set of psychosocial variables were added to the models, the change in variance ranged from 26% to 41%—for total, 32%; social, 35%; psychological, 41%; environmental, 26%.

Effects of Individual Predictors on the Various Models

Of additional interest were the significant individual predictors in each model after all sets were input. In the psychological, social, and total QOL models, depression and coping significantly predicted these QOL domains, suggesting that as depression increases, psychological, social, and total QOL decrease. When individuals with chronic pain use more coping strategies, their psychological, social, and total QOL improve. For the physical QOL model, pain impairment, pain duration, and interference were significant predictors, suggesting that increased perception of pain impairment, longer intervals of pain duration, as well as increased daily interference from pain result in lower physical QOL. Finally, depression was the only significant individual predictor in the environmental QOL model, suggesting that as depression increases, environmental QOL decreases.

The findings from this study are consistent with the ample body of research that has found significant relationships among pain, depression, coping, and QOL (e.g., Becker et al., 1997; Hopman-Rock et al., 1997; Hwang et al., 2002; Lame et al., 2005; Munoz et al., 2005; Petrak et al., 2003; Smith et al., 2003; Ward et al., 1998). For example, Becker et al. (1997) found that individuals with chronic pain reported lower QOL and higher depression rates as compared to those of control groups. In addition, studies have shown that anxiety and depression are negatively related to QOL in this population (Munoz et al., 2005; Smith et al., 2003). In regard to coping, Hopman-Rock et al. (1997) found that positive coping skills such as seeking social support, predicted a better QOL, whereas Petrak et al. (2003) showed that negative coping strategies that involve increasing pain behaviors and catastrophizing have a negative indirect effect on QOL through perception of pain impairment. Finally, Ward et al. (1998) found negatives relationships among negative coping styles, QOL, and depression.

Regarding the pain-related variables investigated in this study, the physical QOL model revealed significant individual pain predictors (perceived pain impairment and pain duration), suggesting that individuals who perceive higher levels of pain-related functional impairment and/or have longer intervals of pain experience lower physical QOL. This finding is consistent with prior research that has shown that pain severity does not have a direct effect on the adjustment and/or the QOL of people with chronic pain. Rather, the perceived level of functional impairment and interference caused by the pain mediates the effects of pain on adjustment and QOL (Hwang et al., 2002; Lame et al., 2005). For instance, Hwang et al. (2002) found that pain severity indirectly affects QOL through the level of perceived interference in daily activities.

In conclusion, results from the present study provide additional support for the large body of literature that suggests that psychosocial variables can alter the effects of pain and other stressors on health-related outcomes (e.g., Becker et al., 1997; Hopman-Rock et al., 1997; Lame et al., 2005; Munoz et al., 2005; Petrak et al., 2003; Richardson & Richardson, 1999; Smith, 2000; Smith et al., 2003; Ward et al., 1998). Of particular importance are the significant relationships found among depression, coping, and QOL. Depression is a common condition

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among persons with chronic pain; therefore, treating underlying depression should be underscored. In addition, a beneficial intervention may involve providing interventions that focus on developing positive coping strategies and changing negative cognitions toward managing the pain symptoms and improving functional abilities.

Limitations

Several limitations should be considered when interpreting the findings from this study. First, the use of a nonrandom convenience sample consisting primarily of persons with work-related musculoskeletal pain poses a threat to the external validity. Second, several variables that have been shown to be related to QOL, such as nature of pain, distorted ambulation, cost of treatment, cognitive functioning, and vocational aspects (involvement of return to work during rehabilitation), were not investigated, because of the homogeneous nature of the sample. For example, cost of treatment could not be investigated because all participants were covered by workers' compensation. Similarly, the nature of the injury that resulted in the chronic pain was mainly work related and musculoskeletal; thus, cognitive functioning and degree of distorted ambulation were relatively homogeneous and may not have had as much an impact when compared to cases such as amputation and severe head injuries, which would cause significant degrees of ambulatory and cognitive function. Thus, the findings from this study may have been affected by a number of variables that were not heterogeneously possible to investigate. From a vocational perspective, not receiving workers' compensation and limited work engagement have been shown to predict QOL, yet the current sample consisted of workers' compensation cases of which 81.9% were not actively working (full-time or gradual return to work). Thus, we could not investigate whether having workers' compensation support and/or being actively engaged in gradual return to work predicted QOL. Third, all the measures in this study were self-report, introducing the possibility that correlations were due to a common response bias in the way that participants responded. Finally, because of the correlational design of this study, causal inferences cannot be made.

Implications

The present study demonstrates that pain-related and psychosocial variables contribute to the QOL of persons with chronic pain. In regard to pain, impairment and duration were predictors of physical QOL. Therefore, counselors working with this population should be cognizant that although people with chronic pain may experience frequent painful sensations, the perception of how the pain adds to the dysfunctionality of daily routines and work is central to their QOL. Therefore, although reducing the painful sensation using medication and other physical modalities of treatment is important, understanding a client's perception of how the pain affects his or her daily functioning is also an important area for counselors to focus on. For instance, if a client is experiencing challenges in basic self-care skills, a referral to an occupational therapist to help with assistive technology may reduce the level of impairment. Similarly, a person facing challenges at work associated with job modification can be accommodated by having a rehabilitation counselor conduct a job analysis to assist in making appropriate modifications at work.

Given the influence of psychosocial variables on QOL found in this study, personal adjustment counseling is an important treatment option for this population. Among the four psychosocial variables studied, depression, coping, and interference were significant predictors of QOL. The literature consistently demonstrates a high prevalence of depression among this population (Banks & Kerns, 1996; Brown, 1990; Fordyce, 1982; Monsein & Cliff, 1995; Ohayon, 2004), and results in this study found depression to have a direct effect on QOL. Therefore, counselors should be aware of the potential stress associated with physical pain sensations and the consequent impairment that likely contributes to depression among individuals with chronic pain. In addition, a careful screening and ongoing assessment of the client's emotional functioning is imperative, and early counseling intervention should be provided should clients develop depression.

Regarding coping, counselors need to be equipped to help clients replace negative coping strategies with positive coping skills to deal more effectively with chronic pain. In this study, coping was operationalized to include positive pain coping behaviors, such as diverting attention, increasing moderate amounts of physical activities to enhance healing and movement, distracting, reinterpretation of painful sensation, and avoiding negative coping such as catastrophizing. Assistance in utilizing these types of coping strategies and reducing negative coping and thinking may prevent clients in developing depression and other negative psychological problems.

In this study, interference in daily functioning predicted physical QOL; therefore, rehabilitation counselors need to address ways to maintain daily activities and structure through counseling and support. Interference may be reduced by assisting clients in developing alternative ways to remain engaged in daily routines and in encouraging them to seek outside support as needed.

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