Applied Research Quality Life (2011) 6:53–70
DOI 10.1007/s11482-010-9113-7

The Effect of Dispositional Optimism in HRQOL in Patients with Chronic Musculoskeletal Pain Conditions in Greece

Zoi Tsakogia · George N. Lyrakos · Dimitrios Damigos · Venetsanos Mayreas · Ioannis D. K. Dimoliatis

Received: 15 November 2009 / Accepted: 4 June 2010 /
Published online: 16 June 2010

Abstract The purpose of this investigation was to study the influence of optimism in the quality of life of patients with musculoskeletal problems that were referred to Amfilohia Rehabilitation Center, because of chronic pain and kinetic difficulties. The sample consisted of 96 patients. The questionnaires that were used are the short form health questionnaire (12 questions; SF12), the life orientation test-revised (LOT-R) and a VAS scale for pain measurement. According to the regression analysis performed, dispositional optimism is an independent factor affecting both the physical ($\beta = .249$, $p < .005$) and mental composite score ($\beta = .414$, $p < .0001$) in patients with musculoskeletal problems, even after controlling for the effect of pain intensity.

Keywords Pain · Musculoskeletal disorders · Health related quality of life · Dispositional optimism

Z. Tsakogia
Amfilohia Rehabilitation Center, Amfilohia, Greece

G. N. Lyrakos (✉)
2nd Department of Anesthesiology, Pain Unit, Attiko University Hospital, School of Medicine, University of Athens, Rimini 1 Xaidari, 14462 Athens, Greece
e-mail: geolyr@hotmail.com

D. Damigos
Department of Psychiatry, Laboratory of Medical Psychology, University of Ioaninna, School of Medicine, Ioannina, Greece

V. Mayreas
Department of Psychiatry, University of Ioaninna, School of Medicine, Ioaninna, Greece

I. D. K. Dimoliatis
Department of Hygiene & Epidemiology, University of Ioaninna, School of Medicine, Ioannina, Greece

Introduction

Musculoskeletal disorders (MSD) include a wide range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels. These include clinical syndromes such as tendon inflammations and related conditions (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthrosis, as well as less well standardized conditions such as myalgia, low back pain and other regional pain syndromes not attributable to known pathology. Body regions most commonly involved are the low back, neck, shoulder, forearm, and hand, although recently the lower extremity has received more attention (Punnett and Wegman 2004).

Interestingly, individuals with the same level of disease severity may display different levels of disability. Furthermore, it is estimated that about half of self-reported disability is due to factors other than actual functional impairment or disease severity (Eaton et al. 1990; Spiegel et al. 1988). In fact, it has been estimated that only 30% of patients who display significant radiologic evidence of osteoarthritis will report physical symptoms (Cobb et al. 1957). Factors such as pain, personality, and other psychological variables may play a significant role in disability (Daltroy and Liang 1993). Reviewing studies of predictors of recovery versus continued disability maladaptive attitudes and beliefs, lack of social support, heightened emotional reactivity, job dissatisfaction, substance abuse, compensation status, and the prevalence of pain behaviors (e.g., Turk 1997) and psychiatric diagnosis (Gatchel and Epker 1999) appear to be among the best predictors of the transition from acute injury to chronic disability.

Furthermore psychological factors have been reported to be predictive of long term disability for many pain syndromes as well as for pain severity emotional distress and treatment seeking (e.g., Boothby et al. 1999; Johansson and Lindberg 2000). In particular level of depression has been observed to be closely tied to chronic pain (Gatchel 2005) and to play a significant role in premature termination from pain rehabilitation programs (Kerns and Haythornthwaite 1988). Research suggests that 40–50% of chronic pain patients suffer from depressive disorders (Banks and Kerns 1996; Dersh et al. 2006; Romano and Turner 1985) and epidemiologic evidence convey a strong association between chronic pain and depression. Prospective studies of patients with chronic musculoskeletal pain have suggested that chronic pain can cause depression (Atkinson et al. 1991) that depression can cause chronic pain (Magni et al. 1994) and that they exist in a mutually reinforcing relationship (Rudy et al. 1988).

Of particular interest are and an individual's dispositional and global expectations of success or of failure, as described by the constructs of optimism and pessimism. Dispositional optimism is conceptualized as a stable, trait-like personality characteristic comprised of a general, positive mood or attitude about the future and a tendency to anticipate a favorable outcome to life situations, whereas dispositional pessimism is classified as a general, negative expectation for the future (Burke et al. 2000; Scheier and Carver 1992). According to the theory of behavioral self regulation (Carver and Scheier 1998) positive outcome expectancies will only decrease when an individual is confronted with a succession of severe adversities as

he or she will start to doubt the expectancy that positive outcomes will happen (Carver and Scheier 1998). On the other hand research shows that optimistic beliefs are sensitive to emotional stressors (depressive symptoms) (Fournier et al. 2003) and that depression is a risk factor for optimistic beliefs.

Findings are inconsistent and regarding the relationship between optimism and pessimism. Some research suggests that they are independent, negatively correlated constructs (Affleck and Tennen 1996; Puskar et al. 1999; Scheier and Carver 1985), while other studies have identified dispositional optimism/pessimism as a unidimensional construct on a continuum (Gillham et al. 2001; Snyder 1994).

Dispositional optimism refers to an individual's expectations of positive outcomes across situations and over time. Optimists are people who generally have a favorable outlook and expect things to go their way in the future. When people have positive expectations, they believe that they can achieve their goals and thus experience positive feelings (Carver and Scheier 1990). Optimism is associated with reduced depression (Carver et al. 1993; Davis et al. 1998; Long and Sangster 1993), better psychological adjustment to negative life events (Magaletta and Oliver 1999), and increased psychological well-being (Carver et al. 1993; Park et al. 1996; Rothbaum et al. 1982). However, excessive or unrealistic optimism may have a detrimental effect (Fournier et al. 2002; Segerstrom 2005).

Studies have demonstrated that dispositional optimism is related to both physical and psychological outcomes, including health symptoms, intensity of physical symptoms, adjustment to breast cancer, depressive symptomatology and recovery from surgery (for a review see Carver and Scheier 1992). Optimism has been associated with a faster rate of physical recovery and return to normal life activities in a study of recovery following coronary artery bypass surgery (Scheier et al. 1989). Kiyak et al. (1988) found that patients who were more optimistic and anticipated fewer problems with surgery reported better psychological outcomes than patients who anticipated numerous problems. Reker and Wong (1985) found that elderly people classified as optimists reported fewer physical health symptoms at a two-year follow-up. Scheier and Carver (1985) also found optimism to be negatively correlated with symptoms, both concurrently and prospectively. The prospective association, over four weeks, was sustained when initial symptom levels were partial led out.

Peterson and Bossio (1991) provided a review of the links between optimism, pessimism, and health. Drawing from their model of behavioral self-regulation, Scheier and Carver (1987) proposed two mechanisms to explain the relation between optimism and health outcomes. First, optimists have been found to engage in more adaptive problem focused coping strategies (Scheier et al. 1986). Secondly, they may be more persistent in keeping up behaviours helpful to their recovery or health since they see the outcome as likely to be positive.

Further support for the role of optimism and health outcomes is provided by studies that examine the obverse of optimism, namely pessimism. Pessimists are individuals who generally have a more negative outlook on life, expect things to go badly (Scheier and Carver 1985) and consequently experience negative feelings (Carver and Scheier 1992). Empirical findings through research have shown until now that negative emotional reactions—such as psychological distress, anxiety and depression—predict a poorer response to treatment in patients with low-back pain

(Blurnetti and Modesti 1976; Gallagher et al. 1989; Harkapaa et al. 1991; Jarvikoski et al. 1986; Maruta et al. 1979; McCreary et al. 1979; Oostdam and Duivenvoorden 1983). Pessimism has been shown to be predictive of anxiety, stress, self-rated health (Robinson-Whelen et al. 1997), and depressive symptomatology (Bromberger and Matthews 1996), as well as correlated with self-reported psychological symptoms and illness severity (Mroczek et al. 1993).

Above that there is also evidence suggesting that the patients' cognitions and—especially—beliefs in the controllability of pain may affect treatment outcome (Harkapaa et al. 1991; Jensen et al. 1991; Johnson et al. 1989; Roberts et al. 1984). Research on chronic disease and immune functioning suggests that the adaptive benefits of optimism may be dependent on the controllability of the disease (Fournier et al. 2002), as well as the complexity and persistence of stressors (Segerstrom 2005). In the face of difficult life events, optimists may persist in their beliefs that positive results are attainable and may invest greater effort to achieve their goals, despite perhaps insurmountable obstacles (Nes et al. 2005).

Although research on dispositional optimism has been quite extensive, it seems to be a neglected topic among psychological pain research. While research results suggest that in addition to psychological symptoms the patient's cognitions, beliefs and attitudes about pain are also important in the adjustment process and treatment outcome (e.g. Jensen et al. 1991; Turk and Rudy 1992), we don't know the affect that many of these expectations of positive outcomes have on health related quality of life in patients with musculoskeletal problems.

The primary aim of our study was to determine if there is a significant relationship between optimism/ pessimism, HRQOL and pain in a group of musculoskeletal patients referred to a rehabilitation center, because of chronic pain and kinetic difficulties. Our hypothesis was that patients who would score higher in optimism would score higher and in HRQL, while patients who would score lower in optimism would score lower and in HRQL.

Material and Methods

Patients

Consecutive eligible chronic musculoskeletal pain patients referred to the Amfiloxia Rehabilitation Center, Greece, during a 6-month period, from 1 December 2008 to 15 June 2009 were invited to participate in the study. Ethics approval was obtained by the institutional review and scientific board at the Rehabilitation Foundation and written Informed consent was obtained from the 96 patients who accepted to participate in the present research.

The study group consisted of 125 consecutive patients, which met the inclusion criteria for musculoskeletal pain disorder. After the first interview only 96 of them met the rest of the inclusion criteria and completed voluntarily a self administrated survey, including SF12, GrLOT-R and a VAS scale for pain measurement.

The inclusion criteria were detectable chronic musculoskeletal pain disorder. Men and women of all races between the age of 18 and 75 years, who could

read and write in the Greek language, were included. Patients who were receiving or had received treatment with antipsychotics during the past 12 months were excluded. Patients with life-threatening medical problems were also excluded.

Questionnaire Variables

The questionnaires included items on sociodemographic factors, work, medical history (surgery, previous physiotherapy, psychological and ergotherapy treatment) and pain intensity and chronicity. The following variables were used in the present study.

Health Related Quality of Life (HRQL)

This was evaluated using the SF-12, which has been validated for use among Greek people (Kontodimopoulos et al. 2007) and consists the short form of SF-36 which is a self-administered, generic health related quality of life (HRQL) instrument that assesses function and wellbeing via multi-item scales measuring the following eight domains (Ware et al. 1993, 1995a; Ware and Sherbourne 1992): physical functioning (PF), role physical (RP), role emotional (RE), vitality (VT), mental health (MH), social functioning (SF), general health (GH), and bodily pain (BP).

The 12-item Health Survey (SF-12) was developed as a shorter alternative to the SF-36 for use in large-scale studies, and its reliability and validity have been documented (Ware et al. 1996). Scale scores are estimated for four of the health concepts (PF, RP, RE and MH) using two items each, whereas the remaining four (BP, GH, VT and SF) are represented by a single item. All 12 items are used to calculate the physical and mental component summary scores (PCS12 and MCS12) by applying a scoring algorithm empirically derived from the data of a US general population survey (Ware et al. 1995b). Performance of the component summary scores was initially studied in nine languages and it has been recommended that the US-derived summary scores, which yield a mean of 50 and a SD of 10, be used in order to facilitate cross-cultural comparison of results (Gandek et al. 1998). It appears to satisfactorily replicate SF-36 summary scores making it an attractive generic instrument to use in clinical practice or research when studying HRQL (Kontodimopoulos et al. 2007; Ware et al. 1993, 1995a, b; Ware and Sherbourne 1992). The SF-12 has been extensively used in health status studies involving the general population (Johnson and Coons 1998; Johnson and Pickard 2000; Hanmer et al. 2006), as well as in studies with disease groups (Gandhi et al. 2001; Globe et al. 2002; Haywood et al. 2002; Cote et al. 2004).

Dispositional Optimism

The Life Orientation Test-Revised (LOT-R)

The LOT-R (Scheier et al. 1994) is a 6-item measure (plus 4 filler items) of individual-differences in optimism (e.g., “in uncertain times, I usually expect the best”) and pessimism (e.g., “If something can go wrong for me, it will”).

The LOT-R is a brief modified version of the original Life Orientation Test (LOT; Scheier and Carver 1985) and has been found to correlate .95 with the latter (see Scheier et al. 1994). Respondents are asked to rate the extent of their agreement to these items across a 5-point Likert-type scale ranging from 0 (strongly disagree) to 4 (strongly agree). Of the six active items, three are stated positively and three negatively. The LOT-R generates one single summary score through a simple summing of the item scores, giving a possible range of 0±24, with high scores indicating a greater degree of optimism. In the present study optimism was evaluated using a Greek version of the Life Orientation Test Revised (GrLOT-R) (Lyrakos et al. 2010). A principal-components factor analysis of the six LOT-R items produced one factor with eigenvalue greater than 1 and explained 62.97% of the variance. Gr LOT-R has proved to be reliable and valid in measuring dispositional optimism. In this study the Cronbach's alpha was 0, 877.

Pain

Pain was assessed using a 'pain meter'. This comprised a blue-red plastic rule graduated in 11 points labeled 0–10, along with a red pointer slides revealing a red bar. Respondents were asked to move the slider to a point corresponding to 'Your pain at its worst in the last month'. Respondents were told that a rating of '0' denoted 'no pain at all' while a '10' was 'pain so severe as to prohibit all activity; the worst pain you can imagine'. Scores were then transferred by the interviewer to an 11-point (0–10), 10 cm visual analogue (VA) scale labeled '0' and '10' at opposite ends. This was later coded to an integer from 1 to 10.

Statistical Analysis

The normality of the items of all measures was investigated and found to be within the level recommended for confirmatory factor analysis CFA with maximum-likelihood (ML) estimation (skewness<2, kurtosis<7; West et al. 1995) and still within acceptable values for normality (Curran et al. 1996).

Mean and standard deviation (SD) assessed sample characteristics. Linear associations between study variables were examined using the Pearson product-moment correlation coefficient (r). Statistical analysis was performed using SPSS for Windows 16. Analyses of the relationship between independent variables and HRQL were performed to establish those variables associated with HRQL.

Due to past decade's confusion and controversy that has arisen regarding the dimensionality of the LOT in order to estimate the factor structure of the LOT-R for the present study, an exploratory factor analysis using principal axis factoring with an orthogonal (varimax) rotation was conducted to the sample (Table 1). Following the one factor solution that revealed from the factor analysis we used the overall score of GrLOT-R to access the influence of optimism in HRQL. Bivariate analyses (*t*-tests, ANOVA and Pearson's and Spearman's correlation coefficients as appropriate) were then performed to evaluate the relationships between independent variables and the two main domains of the SF12, the PCS12 and MCS12. Those

independent variables that were associated with a dependent variable in bivariate analyses with a p value <0.05 were subsequently included in linear multiple regression analyses to determine independent predictors.

Two separate linear regression analyses were conducted to examine the effects of optimism on each of the two main domains of SF12 with optimism entered in the last step of each model.

Results

Sample

The study group consists of 96 patients who accepted and consented to participate in the present research (Table 2) out of 125 that referred to the Amfiloxia Rehabilitation Center, Greece, during the 6-month period of the study (response rate 77%). Their age ranged from 18 to 72 years, with an average of 54 years (SD 12,6). Sixty one percent of the sample was women, 58% of primary education, and 79% married. Nineteen percent of the patients were suffering from MSD in legs, 18.8% in neck, 16.7% in the back, 7.3% in hands and 37.5% were suffering from more than one musculoskeletal problems.

Descriptive Analysis and Correlations

Table 3 presents correlations for age, optimism, physical (PCS12) and mental (MCS12) composite scores of SF12, MSD pain duration, and pain intensity summary scores. Both PCS12 and MCS12 were significantly ($p<0.001$) correlated with optimism. There were three significant negative correlations between the PCS12 and age, MSD pain duration, and intensity of pain. For the MCS12, there were only one significant negative also correlation with intensity of pain.

Table 1 Factor analysis for GrLOT-R for patients with musculoskeletal pain conditions

Component Matrix[a]	Factor
LOT-R items	1
lot1: In uncertain times, I usually expect the best.	,813
lot3: If something can go wrong for me, it will.	,679
lot4: I'm always optimistic about my future.	,857
lot7: I hardly ever expect things to go my way.	,760
lot9: I rarely count on good things happening to me.	,751
lot10: Overall, I expect more good things to happen to me than bad.	,882
Eigenvalues	3.778
Explained variance	62.968

Extraction Method: Principal Component Analysis.

[a]. 1 components extracted

Table 2 Demographic and clinical characteristics of the sample, according to gender

Characteristic †	Total	Men	Women
Gender; n (%)	96 (100.0)	28 (29.2)	68 (70.8)
Education; n (%)			
Primary	56 (58.9)	13 (46.4)	43 (64.2)
High school	29 (30.5)	12 (42.9)	17 (25.4)
University	10 (10.5)	3 (10.7)	7 (10.4)
Marital status; n (%)			
Single	10 (10.4)	5 (17.2)	5 (7.5)
Married	79 (82.3)	23 (79.3)	56 (83.6)
Divorced / widowed	7 (7.3)	1 (3.4)	6 (9.0)
MSD location; n (%)†			
Only neck	18 (18.8)	2 (6.9)	16 (23.9)
Only hands	7 (7.3)	5 (17.2)	2 (3.0)
Only back (high and low)	16 (16.7)	10 (34.5)	6 (9.0)
Only legs	19 (19.8)	7 (24.1)	12 (17.9)
At least 2 locations	36 (37.5)	5 (17.2)	31 (46.3)
Reason for seeking treatment; n (%)			
Pain	42 (43.8)	12 (41.4)	30 (44.8)
Kinetic difficulties	11 (11.5)	6 (20.7)	5 (7.5)
Both in the same degree	43 (44.8)	11 (37.9)	32 (47.8)
Treatment; n (%)			
Surgical operation	18 (10.8)	7 (17.5)	11 (8.7)
Physiotherapy	67 (40.4)	18 (45.0)	49 (38.9)
Psychological treatment	5 (3.0)	1 (2.5)	4 (3.2)
Sleeping disorders; n (%)	67 (69.8)	19 (67.9)	48 (70.6)
Age; mean years (SD)	51.9 (12.6)	50.5 (14.2)	52.6 (11.9)
Pain duration; mean years (SD)	7.1 (2.4)	2.1 (1.3)	2.5 (1.2)
Pain intensity; mean VAS (SD)†	6.1 (2.6)	4.8 (2.1)	6.8 (2.6)
PCS12; mean score (SD)†	37.7 (11.1)	41.2 (9.9)	36.2 (11.4)
MCS12; mean score (SD)†	45.9 (11.6)	50.1 (11.2)	44.1 (5.6)
GrLOT-R; mean score (SD)	15.5 (5.6)	16.2 (5.6)	15.2 (5.6)

Percentages within gender (except for gender, within total)

† Using chi-square for percentages (based on absolute numbers) and *t*-test for means, after checking that their conditions are met, no difference according to gender was found (in all cases $p>0.17$), except for MSD location ($X^2=21.6$, $p=.0001$), Pain intensity (*t*-test=3.649, $p=.0001$), PCS12 (*t*-test=2.054, $p=.043$), and MCS12 (*t*-test= 2.362, $p=.020$)

Testing for Control Variables

The extent to which demographic variables (age, education, marital status, employment status), and medical variables (such as pain intensity and duration, sleeping difficulties due to pain, and past treatment) were related to outcome

Table 3 Correlations of research variables†

Variables	Age	Pain duration	Pain intensity	PCS12	MCS12
Age	–				
Pain duration	.237 (**.020**)	–			
Pain intensity	.212 (**.038**)	.054 (.603)	–		
PCS12	−.222 (**.030**)	−.276 (**.006**)	−.364 (**.000**)	–	
MCS12	.047 (.651)	.022 (.830)	−.215 (**.036**)	.124 (.228)	–
GrLOT-R	.135 (.188)	.011 (.919)	−.213 (**.037**)	.287 (**.005**)	.443 (**.000**)

† Pearson's r (*p*-value). In bold the significant 2-tailed *p*-values (<0.05)

variables was assessed, thus determining the need control for these variables in the main analyses. The significant associations with the study outcome variables that emerged from the *t*-test and ANOVA analyses are shown in Tables 2 and 4. Sleeping difficulties due to pain were negatively associated with PCS12 (t=−2.243, $p<0.05$). There were no other significant differences between composite scores of SF12 or GrLOT-R and demographical characteristics or previous treatment options such as physiotherapy or psychological treatment.

A one-way between groups analysis of variance (Table 4) was conducted to explore the impact of the MSD region in HRQOL as measured by the PCS12 and MCS12. There was statistically significant difference at the $p<0.001$ level in PCS12 scores for the five groups [$F_{4,\ 91}=7.338$, $p=0.0001$]. Post-hoc comparisons using the Group comparison with Bonferroni correction ($p<0.05$) indicated that the mean score of PCS12 for people suffering from neck MSD (mean=45.6, SD=10.6) was significantly different from the mean score of PCS12 for patients suffering from leg MSD (mean=31.2, SD=10.8) (mean difference=14.34, $p=0.0001$) and for patients suffering in more than one regions MSD (mean=35.9, SD=9.7) (mean difference= 9.66, p=0.001). Also the mean scores for hands MSD (mean=48.5, SD=9.8) was significantly different from legs MSD (mean difference=17.21, $p<0.001$) and more than one regions MSD (mean difference=12.53, $p<0.05$).

Regression Analysis for HRQOL Model

Multiple linear regression analysis was used to develop a model for predicting PCS12 and a model for predicting MCS12. The results of the regression analyses with regression coefficients are presented in Table 5. Each of the predictor variables had a significant ($p<.01$) zero-order correlation with PCS12 and MCS12 for each model, but only pain intensity, pain duration and optimism predictors had significant ($p<.05$) partial effects in the full model for PCS12.

As it was expected pain intensity and chronicity of pain were consistently related to poorer physical functioning while optimism was related to better physical functioning. Optimism was the only predictor for mental composite score (MCS12) explaining the 41% of the MCS12 ($\beta=.414$, $p<0.0001$). Higher optimism scores were associated with significantly better MCS12.

Table 4 Association between the dependent variables PCS12, MCS12 & GrLOT-R (mean score (SD)) and demographic & clinical characteristics of the sample

Variable‡	PCS12	MCS12	GrLOT-R
Sleeping difficulties			
Yes	41.5 (9.7)	47.9 (13.3)	17.4 (4.7)
No	36.1 (11.4)	45.1 (10.8)	14.6 (5.7)
Test[1] (*p*-value)	2.243 (**.027**)	1.071 (.287)	2.348 (**.021**)
Surgical operation			
Yes	30.9 (7.9)	45.5 (13.1)	13.7 (5.8)
No	39.3 (11.2)	46.0 (11.4)	15.9 (5.5)
Test[1] (*p*-value)	3.692 (**.001**)	0.176 (.860)	1.487 (.140)
Physiotherapy			
Yes	38.7 (10.2)	45.4 (11.7)	15.7 (5.9)
No	35.7 (12.9)	47.3 (11.7)	14.9 (4.6)
Test[1] (*p*-value)	1.111 (.272)	−0.735 (.464)	0.621 (.536)
Psychological treatment			
Yes	37.9 (7.9)	33.8 (9.3)	15.4 (6.6)
No	37.7 (11.3)	46.6 (11.4)	15.5 (5.5)
Test[1] (*p*-value)	0.032 (.975)	−2.457 (**.016**)	−0.028 (.978)
MSD location			
Only neck*	45.6 (10.7)	45.6 (12.2)	16.1 (4.3)
Only hands*	48.5 (4.9)	47.9 (9.1)	19 (3.5)
Only back (high and low)	36.7 (9.7)	49.2 (13.7)	15.5 (6.5)
Only legs*	31.2 (10.8)	45.4 (12.9)	13.8 (4.7)
At least 2 locations*	35.9 (9.7)	44.5 (10.3)	15.3 (6.3)
Test[2] (*p*-value)	7.338 (**.0001**)	0.488 (.744)	1.189 (.321)
Marital status			
Single	37.6 (11.1)	43.9 (12.6)	13.7 (7.6)
Married	38.1 (11.2)	43.1 (11.9)	15.9 (5.3)
Test[1] (*p*-value)	0.339 (.713)	0.199 (.820)	2.021 (.138)
Reason for seeking treatment			
Pain	39.6 (12.0)	46.0 (11.7)	15.5 (6.1)
Kinetic difficulties	37.6 (7.3)	52.3 (10.6)	17.0 (3.0)
Both in the same degree	36.0 (10.9)	44.2 (11.5)	15.1 (5.6)
Test[2] (*p*-value)	1.069 (.348)	2.205 (.116)	0.522 (.595)

‡ For gender see Table 1.

[1] *t*-test for independent samples; conditions are checked

[2] one-way between groups analysis of variance; conditions are checked

*Post hoc tests. Bonferroni. The mean difference is significant at the 0.05 level.

In bold the significant (<0.05) 2-tailed *p*-values

Table 5 Multiple regression analysis for PCS 12 and MCS 12

	PCS12		MCS12	
	b (SE)	p	b (SE)	p
Step1				
Age	−.180 (.104)	.129		
Gender	−.185 (2.436)	.071	−.226 (2.570)	.029
Education	.053 (1.827)	.659	.067 (1.638)	.513
Step 2				
Age	−.067 (.104)	.568		
Gender	−.055 (2.488)	.596	−.182 (2.705)	.094
Education	.061 (1.814)	.608	.032 (1.692)	.764
Pain duration	−.231 (.137)	.028		
Sleeping difficulties due to pain	.052 (2.561)	.624		
Pain intensity	−.278 (.497)	.018	−.141 (.500)	.207
Step 3				
Age	−.140 (.104)	.238		
Gender	−.052 (2.415)	.604	−.179 (2.467)	.071
Education	.013 (1.784)	.914	.019 (1.544)	.845
Pain duration	−.224 (.133)	.027		
Sleeping difficulties due to pain	.006 (2.524)	.957		
Pain intensity	−.245 (.486)	.032	−.058 (.464)	.575
GrLOT-R	.249 (.196)	.013	.414 (.196)	.000

F, df, and R^2 are for PCS12: 2.948, 3/92, .088 (first step), 4.038, 6/89, .214 (second step), and 4.601, 7/88, .268 (third step); and for MCS12: 2.989, 2/93, .060 (first step), 2.544, 3/92, .077 (second step), and 7.189, 4/91, .240 (third step)

Discussion

The purpose of this study was to examine the relationship between health related quality of life as it can be accessed through a generic measurement (SF12) and optimism as it can be measured with life orientation test revised (LOT-R) in patients with musculoskeletal disorders, and we found that optimism is a strong predictor for mental health in patients with musculoskeletal problems.

The results from the series of analyses conducted in this study are not without some limitations. First, the sample size was relatively small. Further, in our sample there was greater representation of females than males, but more women than men referred to the rehabilitation center for treatment (38 male and 96females). Also, our sample comprised patients with diverse pain conditions of varying durations so we can't make conclusions for each group of patients individually. Thus, any potential coping differences due to specific pain conditions or durational period could not have been revealed from our data. In addition the cross sectional nature of the present study precludes inference about causal direction despite the assumed dispositional character of optimism. Taking the limitations of this study together,

then, the present study is viewed as a preliminary work that would be an impetus for more complex studies with larger samples. However we believe that a representative sample could not reverse our main result that MC12 depends heavily on LOT-R.

Though, comparison of our study with previous work investigating the role of dispositional optimism as a predictor of treatment outcome can only be made in general terms because of the very different patient groups and means of assessing outcome used in the various studies, there are, nevertheless, some similarities.

Previous research suggests that cognitive predispositions such as optimism/pessimism may play a significant role in how a person copes with chronic illness and assesses his symptoms (Affleck et al. 2001). In addition, optimism/pessimism may influence health outcomes (Peterson and Seligman 1984; Peterson et al. 1988a,b). For example, Affleck and colleagues (2001) found that the most optimistic asthma patients were least likely to take extra medication for worsening symptoms, whereas the most pessimistic asthma patients were more likely to vent distressing emotions. Similar to these findings the statistical analysis of the present study when an independent sample's *t*-test was conducted to compare the optimism scores, revealed that there was a significant difference for patients suffering from sleeping difficulties due to pain, with more optimistic patients having less sleeping difficulties ($t=-2.348$, $p<0.05$). These results indicate that more optimistic patients have less sleeping difficulties, thus they cope better with their musculoskeletal problem.

Kreitler et al (1993), found no association between optimism and self-rated health in sample of cancer patients, although this was a cross-sectional study with a quite different indicator of optimism (one item) which is different to our results where optimism has a significant contribution to the physical component score too.

In total the main hypothesis of the present study was that optimism could be a significant predictor of both mental and physical dimensions of health related quality of life. Indeed optimism and MSD pain (intensity and chronicity) was found to explain the 24% of the variance of physical function (Table 3), while optimism was the only predictor of MSC12 explaining the 41% of the variance.

Optimism was also a statistically significant predictor of HRQL (MCS; $b=0.37$ and PCS; $b=0.30$), in a study investigating the relationships between optimism, hopelessness, partner support and HRQL in 155 cancer patients and their partners (Gustavsson-Lilius et al. 2007). Similar to our findings, prior research has suggested that dispositional optimism and pessimism may be linked to important physical and mental health outcomes (Leonard et al. 2003; Brenes et al. 2002).

Another issue about comparing our study with others concerning dispositional optimism is that over the past twenty years much confusion and controversy has arisen regarding the dimensionality of the LOT. Scheier and Carver (1985) have preferred the unidimensional view, that is, optimism and pessimism form polar opposites. This suggests that an individual can be either optimistic or pessimistic but cannot be both. It is their opinion that the two separate dimensions that do emerge in some studies probably reflect differences in item wording rather than content. Some research, however, (Vautier et al. 2003) indicates that this view may be inaccurate and that optimism can be better conceptualized as two partially independent dimensions on which an individual can score positively or negatively.

Factor analysis in the present study identified one factor accounting for 62.9% of the variance. This solution was factorially simple and interpretable, with the six

items loading on one Factor (eigenvalues and percentage variance, derived from initial principal axis factoring, 3.78 and 62.97% respectively). Lai et al (1998) also used confirmatory factor analysis with a Hong Kong Chinese sample and found that their adapted version of the LOT-R (CLOT-R) was best represented by a one factor model.

The results of Brenes et al (2002) indicated that traits of dispositional optimism and pessimism also related to the performance of daily physical functions such as walking, climbing stairs, lifting, and transferring in osteoarthritis patients. Specifically, the results indicated that pessimism is robustly related to physical function while optimism is not. Pessimism was significantly correlated with each physical function even after controlling for a range of covariates, including pain. This finding strengthens the argument that optimism and pessimism are not simply polar opposites of the same trait, but distinct, orthogonal dimensions as suggested by others (Mroczek et al. 1993; Scheier et al. 1994).

These findings are consistent with those of Robinson-Whelen and colleagues (1997), who found that pessimism, but not optimism, was a significant predictor of subsequent self-reported physical and psychological health among older adults. Similarly, Schulz et al. (1996) found that pessimism was a significant predictor of mortality among middle-aged cancer patients, while optimism was not. They did not find a pessimism-mortality association among older patients. Due to factor analysis, comparison with these researches that measured optimism and pessimism independently was not possible.

Future population-based studies using larger sample sizes may confirm or alter our preliminary findings. Nonetheless, our data suggest that optimism/pessimism may be an important factor worth considering in future investigations of HRQOL and emotional status in MSD patients.

Finally we should mention that dispositional optimism is thought to be a fairly stable personality characteristic (Scheier and Carver 1985) but the fact that it has been found to be associated with social desirability and anxiety (Schweizer et al. 1999), depression (Fournier et al. 2003) and to have a mediating role between pain and QOL (Wong and Fielding 2007), suggests that it may not be completely stable, in which case we may be assessing an aspect of anxiety or depression and/or similar constructs.

Because of the first hypothesis of the present study that optimism is a significant predictor variable of HRQL, we did not control for anxiety or depression, which have been shown to be related in other articles to HRQL in cancer patients (Hammerlid et al. 1999; D'Antonio et al. 1998), although the mental component score contains items concerning depression and anxiety. In this respect it is interesting to note that the GrLOT ratings were moderately associated to emotional function. The complex relationship between optimism, HRQL and depression remains to be understood in this context along with to what extent the HRQL following medical treatment is related to traits, psychological changes, psychiatric illness and other clinical and sociodemographic factors in patients with MSD.

Concluding it seems that optimistic patients deal better with musculoskeletal problems and have a better mental health than pessimistic patients. Specifically, patients with positive outcome expectancies display engagement in dealing with their health, even when they are confronted with uncontrollable or unattainable

aspects of their health. In that case, patients remain mentally engaged and turn to new realistic attainable goals by focusing on specific proximal problems (Folkman and Moskowitz 2000). Consequently, of great importance are biopsychosocial approaches and multidisciplinary programs in rehabilitation, so as patients have the best possible input about their condition in order to establish attainable goals in their treatment and life in general. Encouraging patients adopt attainable realistic goals, the possibility of meeting their goals and experiencing good outcome is rising and thus rising and their expectancies for good outcome. After all, confronting unattainable goals, along with experience of failure and stagnation of progress toward goal attainment, may result in reduced well-being and enhanced psychological distress (Carver and Scheier 1990).

Additionally the impact of optimistic beliefs on emotional and behavioral adaptation over time is to a substantial degree, dependent on the stability of optimism. Since findings suggest that a succession of adversities may ultimately result in reduced optimistic beliefs with negative consequences for adaptation (Carver and Scheier 1998), therapeutic attempts to increase optimism in rehabilitation maybe useful in promoting adaptation. Optimistic beliefs are supposed to change with cognitive techniques (Seligman 1991; Riskind et al. 1996). Employing such techniques may help patients to imagine future outcomes in a more positive perspective, identifying something good in bad experience.

Finally, since research shows that depression is a risk factor for optimistic beliefs (Fournier et al. 2003), it appears relevant to diagnose and treat depression of people with chronic pain.

Acknowledgements We would like to thank the patients that voluntarily took part in this study. Thanks are due to anonymous reviewers for their comments on an earlier version of this paper.

References

Affleck, G., & Tennen, H. (1996). Construing benefits from adversity: adaptational significance and dispositional underpinnings. *Journal of Personality, 64*, 899–922.

Affleck, G., Tennen, H., & Apter, A. (2001). Optimism, pessimism, and daily life with chronic illness. In E. C. Chang (Ed.), *Optimism & pessimism: Implications for theory, research, and practice*. Washington: American Psychological Association.

Atkinson, J. H., Slater, M. A., Patterson, T. L., Gant, I., & Garfin, S. R. (1991). Prevalence, onset, and risk of psychiatric disorders in men with chronic low back pain: a controlled study. *Pain, 45*, 111–121.

Banks, S. M., & Kerns, R. D. (1996). Explaining high rates of depression in chronic pain: a diathesis-stress framework. *Psychological Bulletin, 119*, 95–110.

Blurnetti, A. E., & Modesti, L. M. (1976). Psychological predictors of success or failure of surgical intervention for intractable back pain. In J. J. Bonica & D. Albe-Fessard (Eds.), *Advances in pain research and therapy* (Vol. I, pp. 323–325). New York: Raven Press.

Boothby, J. L., Thorn, B. E., Stroud, M. W., & Jensen, M. P. (1999). Coping with chronic pain. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 343–359). New York: Guilford Press.

Brenes, A. G., Rapp, R. S., Rejeski, J. W., & Miller, E. M. (2002). Do optimism and pessimism predict physical functioning? *Journal of Behavioral Medicine, 25*(3), 219–231.

Bromberger, J. T., & Matthews, K. A. (1996). A longitudinal study of the effects of pessimism, trait anxiety, and life stress on depressive symptoms in middle-aged women. *Psychology and Aging, 11*, 207–213.

Burke, K. L., Joyner, A. B., Czech, D. R., & Wilson, M. J. (2000). An investigation of concurrent validity between two optimism/pessimism questionnaires: the life orientation test-revised and the optimism/pessimism scale. *Current Psychology, 19*, 129–136.

Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: a control-process view. *Psychological Review, 97*, 19–35.

Carver, C. S., & Scheier, M. F. (1992). *Perspectives on personality* (Second Edition). Needham Heights, MA: Allyn & Bacon.

Carver, C. S., & Scheier, M. F. (1998). *On the selfregulation of behavior*. New York: Cambridge University Press.

Carver, C. S., Pozo, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., et al. (1993). How coping mediates the effect of optimism on distress: a study of women with early-stage breast-cancer. *Journal of Personality and Social Psychology, 65*, 375–390.

Cobb, S., Merchant, W. R., & Rubin, T. (1957). The relationship of symptoms to osteoarthritis. *Journal of Chronic Diseases, 5*, 197–204.

Cote, I., Gregoire, J. P., Moisan, J., & Chabot, I. (2004). Quality of life in hypertension: the SF-12 compared to the SF-36. *Canadian Journal of Clinical Pharmacology, 11*, e. 232–e. 238.

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods, 1*, 16–29. doi:10.1037/1082-989X.1.1.16.

Daltroy, L. H., & Liang, M. H. (1993). Arthritis education: Opportunities and state of the art. *Health Education Quarterly, 20*, 3–16.

D'Antonio, L. L., Long, S. A., Zimmerman, G. J., Peterman, A. H., Petti, G. H., & Chonkich, G. D. (1998). Relationship between quality of life and depression in patients with head and neck cancer. *The Laryngoscope, 108*(6), 806–811.

Davis, C. G., Nolen-Hoeksema, S., & Larson, J. (1998). Making sense of loss and benefiting from the experience: two construals of meaning. *Journal of Personality and Social Psychology, 75*, 561–574.

Dersh, J., Gatchel, R. J., Mayer, T. G., Polatin, P. B., & Temple, O. W. (2006). Prevalence of psychiatric disorders in patients with chronic disabling occupational spinal disorders. *Spine, 31*, 1156–1162.

Eaton, H., Phillips, C. B., Partridge, A. J., Larson, M.G., Daltroy, L. H., Logigian, M., et al. (1990). Reliability and validity of measures of physical function for population studies in the elderly. American College Rheumatology/Arthritis Health Professions Association 54th Annual Meeting, Seattle, p. S206.

Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *The American Psychologist, 55*, 647–654.

Fournier, M., de Ridder, D., & Bensing, J. (2002). How optimism contributes to the adaptation of chronic illness. A prospective study into the enduring effects of optimism on adaptation moderated by the controllability of chronic illness. *Personality and Individual Differences, 33*, 1163–1183.

Fournier, M., Ridder, D. E., & Bensing, J. (2003). Is optimism sensitive to the stressors of chronic disease? The impact of Type 1 Diabetes Mellitus and Multiple Sclerosis on optimistic beliefs. *Psychology and Health, 18*(3), 277–294.

Gallagher, R. M., Rauh, V., Haugh, L. D., Milhous, R., Callas, P. W., Langelier, R., et al. (1989). Determinants of return-to-work among low back pain patients. *Pain, 39*, 55–67.

Gandek, B., Ware, J. E., Jr., Aaronson, N. K., Alonso, J., Apolone, G., Bjorner, J., et al. (1998). Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: results from the IQOLA Project International Quality of Life Assessment. *Journal of Clinical Epidemiology, 51*, 1171–1178. doi:10.1016/S0895-4356(98)00109-7.

Gandhi, S. K., Salmon, J. W., Zhao, S. Z., Lambert, B. L., Gore, P. R., & Conrad, K. (2001). Psychometric evaluation of the 12-item short-form health survey (SF-12) in osteoarthritis and rheumatoid arthritis clinical trials. *Clinical Therapeutics, 23*, 1080–1098. doi:10.1016/S0149-2918(01)80093-X.

Gatchel, R. J. (2005). *Clinical essentials of pain management*. Washington: American Psychological Association.

Gatchel, R. J., & Epker, J. (1999). Psychosocial predictors of chronic pain and response to treatment. In R. J. Gatchel & D. C. Turk (Eds.), *Psychosocial factors in pain: Critical perspectives* (pp. 412–434). New York: Guilford Press.

Gillham, J., Shatte, A., Reivich, K., & Seligman, M. (2001). *Optimism, pessimism, and explanatory style*. Washington: American Psychological Association.

Gustavsson-Lilius, M., Julkunen, J., & Hietanen, P. (2007). Quality of life in cancer patients: the role of optimism, hopelessness, and partner support. *Quality of Life Research, 16*, 75–87. doi:10.1007/s11136-006-9101-4.

Globe, D. R., Levin, S., Chang, T. S., Mackenzie, P. J., & Azen, S. (2002). Validity of the SF-12 quality of life instrument in patients with retinal diseases. *Ophthalmology, 109*, 1793–1798. doi:10.1016/S0161-6420(02)01124-7.

Hammerlid, E., Ahlner-Elmqvist, M., Bjordal, K., et al. (1999). A prospective multicentre study in Sweden and Norway of mental distress and psychiatric morbidity in head and neck cancer patients. *British Journal of Cancer, 80*, 766–774.

Hanmer, J., Lawrence, W. F., Anderson, J. P., Kaplan, R. M., & Fryback, D. G. (2006). Report of nationally representative values for the noninstitutionalized US adult population for 7 health-related quality-of-life scores. *Medical Decision Making, 26*, 391–400. doi:10.1177/0272989X06290497.

Harkapaa, K., Jarvikoski, A., Mellin, G., Hurri, H., & Luoma, J. (1991). Health locus of control beliefs and psychological distress as predictors for treatment outcome in low-back pain patients: results of a 3-month follow-up of a controlled intervention study. *Pain, 46*, 3541.

Haywood, K. L., Garratt, A. M., Dziedzic, K., & Dawes, P. T. (2002). Generic measures of health-related quality of life in ankylosing spondylitis: reliability, validity and responsiveness. *Rheumatology, 41*, 1380–1387. doi:10.1093/rheumatology/41.12.1380.

Jarvikoski, A., Harkapaa, K., & Mellin, G. (1986). Symptoms of psychological distress and treatment effects with low-back pain patients. *Pain, 25*, 345–355.

Jensen, M. P., Turner, J. A., Romano, J. M., & Karoly, P. (1991). Coping with chronic pain: a critical review of the literature. *Pain, 47*, 249–283.

Johansson, E., & Lindberg, P. (2000). Low back pain patients in primary care: subgroups based on the multidimensional Pain Inventory. *International Journal of Behavioral Medicine, 7*, 340–352.

Johnson, J. A., & Coons, S. J. (1998). Comparison of the EQ-5D and SF-12 in an adult US sample. *Quality of Life Research, 7*, 155–166. doi:10.1023/A:1008809610703.[PubMed].

Johnson, J. A., & Pickard, A. S. (2000). Comparison of the EQ-5D and SF-12 health surveys in a general population survey in Alberta, Canada. *Medical Care, 38*, 115–121. doi:10.1097/00005650-200001000-00013.[PubMed].

Johnson, L. R., Magnani, B., Chan, V., & Fenante, F. M. (1989). Modifiers of patient-controlled analgesia efficacy. I. Locus of control. *Pain, 39*(1), 17–22.

Kerns, R. D., & Haythornthwaite, J. A. (1988). Depression among chronic pain patients: cognitive-behavioral analysis and effect on rehabilitation outcome. *Journal of Consulting and Clinical Psychology, 56*, 870–876.

Kiyak, H. A., Vitaliano, P. P., & Crinean, J. (1988). Patients' expectations as predictors of orthognathic surgery outcomes. *Health Psychology, 7*, 251–268.

Kontodimopoulos, N., Pappa, E., Niakas, D., & Tountas, Y. (2007). Validity of SF-12 summary scores in a Greek general population. *Health and Quality of Life Outcomes, 5*, 55. doi:10.1186/1477-7525-5-55.

Kreitler, S., Chaitchik, S., Rapoport, Y., Kleitler, H., & Algor, R. (1993). Life satisfaction and health in cancer patients, orthopedic patients and healthy individuals. *Social Science & Medicine, 36*, 547–556.

Lai, J. C. L., Cheung, H., Lee, W., & Yu, H. (1998). The utility of the revised Life Orientation Test to measure optimism among Hong Kong Chinese. *International Journal of Psychology, 33*, 45–56.

Leonard, A. J., Elizabeth, W., & Susan, T. (2003). Chronic fatigue syndrome, coping, optimism and social support health. *Journal of Mental Health, 12*(2), 109–118.

Long, B. C., & Sangster, J. I. (1993). Dispositional optimism pessimism and coping strategies—predictors of psychosocial adjustment of rheumatoid and osteoarthritis patients. *Journal of Applied Social Psychology, 23*, 1069–1091.

Lyrakos, G. N., Damigos, D., Mavreas, V., Georgia, K., & Dimoliatis, I. D. K. (2010). A translation and validation study of the Life Orientation Test Revised in the Greek speaking population of nurses among three hospitals in Athens and Ioannina. *Social Indicators Research, 95*(1), 129–142.

Magaletta, P. R., & Oliver, J. M. (1999). The hope construct, will, and ways: their relations with selfefficacy, optimism, and general well-being. *Journal of Clinical Psychology, 55*, 539–551.

Magni, G., Moreschi, C., Rigatti Luchini, S., & Merskey, H. (1994). Prospective study on the relationship between depressive symptoms and chronic musculoskeletal pain. *Pain, 56*, 289–297.

Maruta, T., Swanson, D. W., & Swenson, W. M. (1979). Chronic pain: which patients may a pain-management program help? *Pain, 7*, 321–329.

McCreary, C., Turner, J., & Dawson, E. (1979). The MMPI as a predictor or response to conservative treatment for low back pain. *Journal of Clinical Psychology, 35*, 278–284.

Mroczek, D. K., Spiro, A., III, Aldwin, C. M., Ozer, D. J., & Bosse, R. (1993). Construct validation of optimism and pessimism in older men: findings from the normative aging study. *Health Psychology, 12*, 406–409.

Nes, L. S., Segerstrom, S. C., & Sephton, S. E. (2005). Engagement and arousal: optimism's effects during a brief stressor. *Personality and Social Psychology Bulletin, 31*, 111–120.

Oostdam, E. M. M., & Duivenvoorden, H. J. (1983). Predictability of the results of surgical intervention in patients with low back pain. *Journal of Psychosomatic Research, 27*, 273–281.

Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality, 64*, 71–105. Peterson and Bossio (1991).

Peterson, C., & Bossio, L. M. (1991). *Health and optimism*. New York: Free Press.

Peterson, C., & Seligman, M. E. P. (1984). Causal explanations as a risk factor for depression: theory and evidence. *Psychological Review, 91*, 347–374.

Peterson, C., Seligman, M. E. P., & Valilant, G. E. (1988). Pessimistic explanatory style is a risk factor for physical illness: a thirty-five-year longitudinal study. *Journal of Personality and Social Psychology, 55*, 23–27.

Peterson, C., Vaillant, G. E., & Seligman, M. E. P. (1988). Pessimistic explanatory style is a risk factor for physical illness: a thirtyfive-year longitudinal study. *Journal of Personality and Social Psychology, 55* (1), 23–27.

Punnett, L., & Wegman, H. D. (2004). Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *Journal of Electromyography and Kinesiology, 14*, 13–23.

Puskar, K. R., Sereika, S. M., Lamb, J., Tusaie-Mumford, K., & McGuinness, T. (1999). Optimism and its relationship to depression, coping, anger, and life events in rural adolescents. *Issues in Mental Health Nursing, 20*(2), 115–130.

Reker, G. T., & Wong, P. T. P. (1985). Personal optimism, physical and mental health: The triumph of successful aging. In J. E. Birren & J. Livingston (Eds.), *Cognition, stress and aging* (pp. 134–173). New York: Prentice Hall.

Riskind, J. H., Sarampote, C. S., & Mercier, M. A. (1996). For every malady a sovereign cure: optimism training. *Journal of Cognitive Psychotherapy: An International Quarterly, 10*, 105–117.

Roberts, N., Smith, R., Bennett, S., Cape, J., Norton, R., & Kilbum, P. (1984). Health beliefs and rehabilitation after lumbar disc surgery. *Journal of Psychosomatic Research, 28*, 139–144.

Robinson-Whelen, S., Kim, C., MacCallum, R. C., & Kiecolt-Glaser, J. K. (1997). Distinguishing optimism from pessimism in older adults: is it more important to be optimistic or not to be pessimistic? *Journal of Personality and Social Psychology, 73*, 1345–1353.

Romano, J., & Turner, J. A. (1985). Chronic pain and depression: does the evidence support a relationship? *Psychological Bulletin, 97*, 18–34.

Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: a 2-process model of perceived control. *Journal of Personality and Social Psychology, 42*, 5–37.

Rudy, T. E., Kerns, R. D., & Turk, D. C. (1988). Chronic pain and depression: toward a cognitive behavioral mediational model. *Pain, 35*, 129–140.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219–247.

Scheier, M. F., & Carver, C. S. (1987). Dispositional optimism and physical well-being: the influence of generalized outcome expectancies on health. *Journal of Personality, 55*, 169–210.

Scheier, M. F., & Carver, C. S. (1992). Effects of optimism on psychological and physical well-being: theoretical overview and empirical update. *Cognitive Therapy and Research, 16*, 201–228.

Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with stress: divergent strategies of optimists and pessimists. *Journal of Personality and Social Psychology, 51*, 1257–1264.

Scheier, M. F., Matthews, K. A., Owens, J. F., Magovern, G. J., Sr., Lefebvre, R. C., Abbott, R. A., et al. (1989). Dispositional optimism and recovery from coronary artery bypass surgery: the beneficial effects on physical and psychological well-being. *Journal of Personality and Social Psychology, 57*, 1024–1040.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67*, 1063–1078.

Schweizer, K., Beck-Seyffer, A., & Schneider, R. (1999). Cognitive bias of optimism and its influence on psychological well-being. *Psychological Reports, 84*(2), 627–636.

Schulz, R., Bookwala, J., Knapp, J. E., Scheier, M., & Williamson, G. M. (1996). Pessimism, age, and cancer mortality. *Psychology and Aging, 11*, 304–309.

Segerstrom, S. C. (2005). Optimism and immunity: do positive thoughts always lead to positive effects. *Brain, Behavior, and Immunity, 19*, 195–200.

Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf.

Snyder, C. R. (1994). *The psychology of hope: You can get there from here*. New York: The Free Press.

Spiegel, J. S., Leake, B., Speigel, T. M., Paulus, H. E., Kane, R. L., Ward, N. B., et al. (1988). What are we measuring? An examination of self-reported functional status measures. *Arthritis & Rheumatism, 31*(6), 721–728.

Turk, D. C. (1997). Transition from acute to chronic pain: Role of demographic and psychosocial factors. In T. S. Jensen, J. A. Turner, & Z. Wiesenfeld-Hallin (Eds.), *Proceedings of the 8th World Congress on Pain: Progress in pain research and management* (pp. 185–213). Seattle: IASP Press.

Turk, D. C., & Rudy, T. E. (1992). Cognitive factors and persistent pain: a glimpse into Pandora's box. *Cognitive Therapy and Research, 16*(2), 99–112.

Vautier, S., Raufaste, E., & Cariou, M. (2003). Dimensionality of the revised life orientation test and the status of filler items. *International Journal of Psychology, 6*(38), 390–400.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36 item short form health survey (SF-36): conceptual framework and item selection. *Medical Care, 30*, 473–483.

Ware, J. E., Snow, K. K., Kosinkio, M., & Gandek, B. (1993). *SF-36 health survey manual and interpreation guide*. Boston: The Health Institute, New England Medical Center.

Ware, J. E., Kosinski, M., Bayliss, M., McHorney, C. A., Rogers, W. H., & Raczek, A. (1995). Comparison of methods for the scoring and statistical analysis of the SF-36 health profiles and summary measures: summary of results from the Medical Outcomes Study. *Medical Care, 33*(Suppl. 4), AS264–AS279.

Ware, J. E., Kosinski, M., & Keller, S. D. (1995). *How to score the SF-12 physical and mental health summary scales. 2*. Boston: The Health Institute.

Ware, J. E., Kosinsk, I. M., & Keller, S. D. (1996). A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*, 220–233. doi:10.1097/00005650-199603000-00003.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 56–75). Thousand Oaks: Sage Publications.

Wong, W. S., & Fielding, R. (2007). Quality of life and pain in Chinese lung cancer patients: is optimism a moderator or mediator? *Quality of Life Research, 16*(1), 53–63.