



Helplessness and loss as mediators between pain and depressive symptoms in fibromyalgia

Rand A. Palomino ^{a,*}, Perry M. Nicassio ^b, Melanie A. Greenberg ^c,
Ernesto P. Medina Jr. ^d

^a *Helix Clinical Research, Inc., La Mesa, 9311 Mesa Vista Ave., La Mesa, CA 91941, USA*

^b *Norman Cousins Center, 300 UCLA Medical Plaza, Rm. 3131, Los Angeles, CA 90095, USA*

^c *California School of Professional Psychology at Alliant International University, Daley Hall, 10455 Pomerado Rd., San Diego, CA 92131, USA*

^d *Beaver Medical Group, 2 West Fern Ave., Redlands, CA 92373, USA*

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Abstract

This study evaluated the contribution of condition-specific helplessness and loss to depression in fibromyalgia (FM). Two models were tested. The first model examined whether loss, measured by the West Haven-Yale Multidimensional Pain Inventory (WHYMPI) Interference Scale, would mediate the relationship between disability and depression. The second model determined whether condition-specific helplessness and loss would mediate the relationship between pain and depression with disability controlled. Eighty patients with confirmed diagnoses of FM were recruited throughout Southern California from general medical clinics, newspaper advertisements, and rheumatology practices. The study design was cross-sectional, using self-report, observational, and interview measures. A composite measure of depression was adopted, consisting of the Center for Epidemiological Studies-Depression Scale and the Hamilton Rating Scale for Depression. Hierarchical multiple regression analyses were conducted using a path analytic framework to examine each model. In Model 1, loss fully mediated the relationship between disability and depression. In Model 2, condition-specific helplessness mediated the relationship between pain and depression, but the contribution of loss was not significant. The findings confirm the importance of helplessness and demonstrate that the cognitive meaning of having FM plays a more central role in predicting depressive symptomatology than illness-related stressors, such as pain or disability.

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1. Introduction

Fibromyalgia syndrome (FM) is the second most common condition seen in rheumatology clinics after osteoarthritis (White et al., 1995). The diagnosis of FM is based on the existence of widespread musculoskeletal pain (upper and lower body) of at least 3 months' duration and the detection of painful tender-

ness in 11 of 18 points on the body along nine bilateral sites (Wolfe et al., 1990). Despite an increase in research efforts within the last few decades, the etiology of FM remains undetermined, and the treatment of this condition has been a challenging and often frustrating experience for medical practitioners and patients alike. Importantly, the national health care costs for FM in the United States have been estimated to be over \$20 billion per year (Thorson, 1998).

In addition to the pain and physical impairment associated with this condition, many patients with FM have serious mood disturbance. FM patients (50–70%) report a lifetime history of depression (Triadafilopoulos et al.,

* Corresponding author. Tel.: +1 619 337 3718; fax: +1 619 741 3615.

E-mail addresses: rapalomino@cox.net (R.A. Palomino), mgreenberg@alliant.edu (M.A. Greenberg).

1991; Hudson et al., 1992). The rate of current major depression is also high, with estimates ranging from 14% to 36% (Hudson et al., 1985; Ahles et al., 1991; Burckhardt et al., 1994; Turk et al., 1996; Walker et al., 1997) compared to estimates of 5.2% for healthy men, and 10.2% for healthy women (Weissman et al., 1991) in community samples. Some studies indicate that FM patients report significantly more severe symptoms of depression, compared to RA patients and healthy controls (Wolfe et al., 1984; Uveges et al., 1990; Krag et al., 1994). The high prevalence of depression in FM contributes to the poor quality of life and fatigue reported by many patients (e.g., Burckhardt et al., 1993; Nicassio et al., 1999; Nicassio and Schuman, 2005) and highlights the significance of research that explores the factors associated with mood disturbance in this population.

2. Cognitions in fibromyalgia

Research on illness cognition has illustrated some important mechanisms that may explain depressive mood in FM. While pain and disability may contribute some variability to depression in FM, patients' beliefs about the controllability of FM may also play critical roles. Two aspects of illness cognition are relevant to understanding the psychological adaptation of patients with chronic pain conditions. The first concerns the cognitive processes of patients (Ingram and Kendall, 1986; Clark et al., 1999). For example, cognitive processes, such as condition-specific cognitive distortions and catastrophizing, have been shown to contribute to increased distress and to mediate the relationship between pain and depression in patients with rheumatoid arthritis (Smith et al., 1990) and low back pain (Lefebvre, 1981; Maxwell et al., 1997).

The second aspect of illness cognition refers to the subjective meanings ascribed by patients to chronic pain, including its impact on functioning and its effect on patients' self-definitions and future expectations. Theorists refer to this as schema content (Clark et al., 1999). While schema content may vary across many different dimensions, one meaning that has been shown to mediate between disease severity and depressive symptoms in chronic pain conditions, including FM, is a sense of helplessness to control the condition (Nicassio et al., 1985, 1995, 1999; Smith et al., 1990). Previous research has demonstrated the importance of the helplessness construct in FM. For example, Nicassio et al. (1995) found that helplessness partially mediated the effects of pain on passive coping and depression. In a later paper, Nicassio and colleagues (Nicassio et al., 1999) reported that condition/pain helplessness partially mediated the effects of both pain and disability on depressive symptoms. Pain and disability still contributed independent variance to depressive symptoms, however, after taking into account the

effects of helplessness, suggesting that other partial mediators may exist.

Another meaning that may serve as a potential mediator between illness symptomatology and depression is loss. In studies of rheumatoid arthritis patients (Katz and Yellin, 1994, 1995, 2001), perceived impairment in the performance of life activities has been positively associated with the development of depressive symptoms, particularly when losses are reported in the area of recreational and social activities. Studies in pain conditions other than FM have examined the constructs of helplessness and loss simultaneously in mediational models (Rudy et al., 1988; Maxwell et al., 1997). The construct of loss in these investigations was assessed by examining declines in functioning in four broad areas of the patients' lives, including employment, household, social and recreational aspects. These studies demonstrated that loss, as measured by a reduction in instrumental activities, termed "interference", and helplessness, served as independent mediators between pain and depression in chronic low back pain patients (Maxwell et al., 1997), and in patients with varied chronic pain conditions, other than FM (Rudy et al., 1988). Previous research has not addressed the contribution of loss to depression in FM, although its mediating effects in other chronic pain populations suggest its potential mediational role in this syndrome.

3. Study objectives

The purpose of this study was to evaluate the constructs of loss and helplessness as mediators of the impact of FM pain and disability on depression. Two models were tested. The first model examined whether loss, operationalized as interference, mediated the relationship between disability and depression in FM. Unlike helplessness, which had previously been studied and defined as a partial mediator between both pain and disability and depressive symptoms in FM (Nicassio et al., 1999), loss had not been examined as a mediator in FM. The purpose of Model 1 was to explore the types of loss that may be most salient to the development and maintenance of depressive symptomatology in these patients. The work of Katz and Yellin (1994, 1995, 2001) has demonstrated that losses in key areas of functioning were highly impactful on depression in RA patients. Based on these results, the authors of this study predicted that perceived loss of basic physical functioning (i.e., walking, climbing stairs or bathing oneself) would contribute to depression, however, the loss of more complex role functions that help to define personal identity, meaning in life, and connections with others would be more salient and impactful. It was hypothesized that the positive relationship between disability and depression would be explained by the degree to which patients experienced interference in these more

complex, socially valued, and personally significant areas of life functioning.

The second model examined mechanisms through which pain, the primary symptom in FM, would be linked to depression. Its purpose was to expand upon previous models studied in FM (Nicassio et al., 1985, 1995, 1999) that defined helplessness as a partial mediator between physical and functional disease aspects and depressive symptoms, and to replicate findings from models conducted in other pain populations (Rudy et al., 1988; Maxwell et al., 1997) with a sample diagnosed with FM. Specifically, the model examined whether condition-specific helplessness and loss mediated the relationship between pain and depression. It was hypothesized that helplessness and loss would serve as independent mediators of the pain–depression relationship, each tapping into different personal meanings ascribed to having FM pain. Perceived loss of physical functioning was kept as a covariate in Model 2, so that loss as a mediator was defined as loss of higher order meanings beyond the loss of basic physical functioning.

4. Methods

4.1. Sampling procedures

FM patients were recruited from private, general medical, and rheumatology clinics, FM support groups, and the community via local newspaper and internet advertisements. Criteria for eligibility for this study were: (a) at least 18 years of age; (b) written confirmation of FM diagnosis by the participant's rheumatologist or physician, (c) confirmation of FM by a physical tender point examination, conducted by the principal investigator, in which at least 11 of 18 tender points were found, and verification that the participant had diffuse upper and lower body pain for a duration of 3 months or more (Wolfe et al., 1990). Exclusionary criteria were: (a) the existence of concomitant rheumatologic disorders, including rheumatoid arthritis, systemic lupus erythematosus, Hashimoto's disease, Sjogren's syndrome, scleroderma and reflex sympathetic dystrophy; (b) the existence of psychotic disorders, bipolar disorder, or other serious psychiatric conditions (c) stability on all medications for FM, including analgesics, antidepressants, anxiolytics, and sleep medications for a minimum of 30 days preceding the study.

While the evaluation and screening process ruled out patients with co-morbid medical and psychiatric disorders, no specific screening was implemented for chronic fatigue syndrome (CFS). Therefore, it is likely that the sample included participants with CFS. However, no participants were enrolled who had CFS only.

4.2. Participants

A total of 80 participants met the above inclusion and exclusion criteria. All participants resided in San Diego, Redlands or neighboring counties in southern California. Of the 80 participants, 45 were recruited from general medical clinics, 15 from newspapers, 14 from FM support groups and 6 from rheumatol-

ogy clinics. The total sample included 76 women and 4 men, with an average age of 52.5 years ($SD = 13.17$). Average reported illness duration (time since diagnosis) was 13.8 years ($SD = 12.83$). Eighty-one percent of the participants were Caucasian, 12% were Hispanic, and the remainder were of African American, Asian, or Native American ethnic origin. Sixty percent were married, 15% were divorced or separated, 18% were single, and 6% were widowed. All participants had completed high school, 53% completed some college, trade school or technical training, 10% completed a 4-year college degree, and 30% completed at least some graduate work. Fifty-five percent of the participants used analgesics, 60% used antidepressants, and 33% used sleep medication to manage their FM symptoms.

4.3. Evaluation of health status and psychosocial functioning

The principal investigator (RAP) and research assistants administered a battery of measures to participants at a private counseling center and a private medical hospital. The battery assessed FM pain, disability, helplessness, loss, and depressive symptoms.

4.4. Predictor variables

4.4.1. Physical disability

Disability was measured by the Medical Outcomes Study Physical Functioning Measure Short Form – 36 (SF-36) – Physical Functioning Subscale (Ware and Sherbourne, 1992). The measure consists of 10 Likert-type items assessing limitations in performing a range of physical activities due to health problems. A physical functioning score is formed by averaging non-missing items that are transformed into a scale from 1 to 100. The internal consistency of the SF-36 in this sample was $\alpha = .88$.

4.4.2. Pain

A multidimensional approach to the assessment of FM pain was adopted, consisting of a composite index score that was comprised of the following measures: (a) the Pain Rating Index (PRI), derived by summing the ranked values associated with adjectives depicting the severity of pain from the McGill Pain Questionnaire (MPQ; Melzack, 1975); (b) Fibromyalgia Impact Questionnaire (FIQ) – Pain Subscale (Burckhardt et al., 1991), consisting of a 100 mm anchored horizontal visual analog scale used to rate pain over the previous week; and (c) American College of Rheumatology 1990 Tender Point Criteria – Manual Tender Point Survey (Wolfe et al., 1990; Sinclair et al., 2003), consisting of the sum of behavioral observations of pain severity with 4-kg force measured by a dolorimeter for the 18 tender points, with ratings corresponding to 0 (no pain), 1 (mild = complaint of pain without grimace, flinch or withdrawal), 2 (moderate = pain plus grimace or flinch), 3 (severe = pain plus marked flinch or withdrawal), 4 (unbearable = patient “untouchable”, withdrawals without palpation). The pain index was derived from the sum of standardized scores of the individual pain measures. Similar composite measures have been effectively employed in other FM research (Nicassio et al., 1995, 1999). Correlations among indices were high, indicating that the overall score reflected a single dimension of pain. The internal consistency reliability of the composite pain measure in this study was $\alpha = .88$.

4.4.3. Helplessness

Condition-specific helplessness was measured using the Rheumatology Attitudes Index (RAI) – 5-item Helplessness Subscale (DeVellis and Callahan, 1993). The RAI assesses the degree to which participants feel helpless in controlling pain and the course of FM. Participants respond to five statements on a Likert scale. The 5-item Helplessness Subscale has been used in previous FM research (Nicassio et al., 1995, 1999) and is based on a factor analysis of the original Arthritis Helplessness Index (Stein et al., 1988), showing the existence of a separate helplessness factor. The internal consistency of the RAI in the current sample was $\alpha = .70$.

4.4.4. Loss

The West Haven-Yale Multidimensional Pain Inventory (WHYMPI) – Interference Subscale (Kerns et al., 1986) assessed the construct of loss. The WHYMPI assesses the impact of chronic pain on patients' (a) daily activities, (b) work, (c) family relationships and (d) social relationships. The Interference Subscale consists of 9 items. For each item, participants rate the extent of loss on a 7-point Likert scale, (e.g., ranging from 0 = no interference to 6 = extreme interference). The 9 items are averaged to produce a total loss (interference) score. The internal consistency reliability of the WHYMPI – Interference Subscale in this research was $\alpha = .89$.

4.5. Criterion variable: depression

Depression was assessed by both self-report and interview. This approach was used to reduce the likelihood that shared self-report method variance could explain the relationship between measures of pain, disability, and depression. Previous research in FM (e.g., Nicassio et al., 1995) has relied substantially on self-report measures of both mediators and depressive symptoms, raising the possibility that the correlation between pain and depression could have been artificially inflated.

4.5.1. Self-rated depression

The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) assessed self-reported depressive symptoms over the past week. The CES-D is a 20-item, Likert-type measure that assesses the prevalence of depressive symptomatology in community samples and has been adopted in research investigating depressive symptoms in FM patients (Nicassio et al., 1999). A cutoff score of 16 indicates depression in community-based samples, while a cutoff score of 19 provides better diagnostic specificity in chronic pain populations (Turk and Okifuji, 1994). Summing across items after reverse scoring items 4, 8, 12 and 16 provides a total depressive symptom score. The internal consistency reliability of the CES-D in this research was $\alpha = .90$.

4.5.2. Observer-rated depression

Based on an interview, the Hamilton Rating Scale for Depression (HRSD) (Hamilton, 1960) provided an objective measure of depressive symptoms. The HRSD consists of 17 items that focus on aspects of mood, guilt, suicidal ideation, eating, sleep, energy level, somatic symptoms, anxiety and compulsive behaviors over the previous week. The interviewer rates the items on either three or five-point scales. Items are summed to produce a total depression score. Williams devel-

oped a structured interview guide to improve the reliability of the measure (1988). A total score from the 17 items of the structured interview by Williams was used in the current study. The internal consistency reliability of the HRSD in this sample was $\alpha = .82$.

4.6. Statistical analyses

Two mediational models were tested. The first model evaluated the role of loss as a mediator between disability and depression. The second model evaluated the roles of condition-specific helplessness and loss simultaneously as mediators between pain and depression. In both models, the contribution of covariates that could plausibly be related to depression (age, marital status, duration of illness, education, gender, antidepressant use, anxiolytic use) was removed from the prediction of depression. In the second model, the contribution of disability was also removed since the goal was to examine the model with pain after physical disability had been controlled.

Hierarchical multiple regression analyses using path analytic procedures were conducted for each model. According to the mediational conditions proposed by Baron and Kenny (1986), for Model 1, loss would qualify as a mediator between disability and depression if (1) disability independently predicted loss, (2) disability independently predicted depression, (3) loss independently predicted depression, and (4) the relationship between disability and depression became non-significant after the contribution of loss to depression (see Fig. 1). Accordingly, for Model 2, helplessness and loss would qualify as mediators of pain and depressive symptoms provided that: (1) pain independently predicted helplessness and loss, (2) pain independently predicted depression, (3) helplessness and loss independently predicted depression, and (4) the paths between pain and depressive symptoms became non-significant after including helplessness and loss in the regression equation.

5. Results

5.1. Descriptive data

With a mean of 24.35 ($SD = 11.49$) on the CES-D, 61% of participants scored in the clinically depressed range on self-reported depression using the more stringent cut-off of 19 for chronic pain patients (Turk and Okifuji, 1994). These scores are comparable to the findings of Nicassio and colleagues (Nicassio et al., 1999) who reported a mean score of 20.13 ($SD = 10.74$). Likewise, mean pain scores in the current sample were similar to those of other FM studies: FIQ – Pain Subscale mean of 60.10 ($SD = 21.88$) and MPQ – Pain Rating Index of 31.52 ($SD = 11.03$) versus mean scores of 64.10 ($SD = 22.46$) and 30.31 ($SD = 11.90$), respectively (Bigatti and Cronan, 2002); ACR 90 tender point count mean of 1.63 ($SD = .43$) versus 1.60 ($SD = .05$) in a previous study (Wolfe et al., 1990). Mediator scores in the current study were also similar to those in other FM samples with a current helplessness mean (RAI) of 16.36 ($SD = 4.01$) versus 17.90 ($SD = 4.81$) (Nicassio et al., 1999) and current interference mean of 4.16

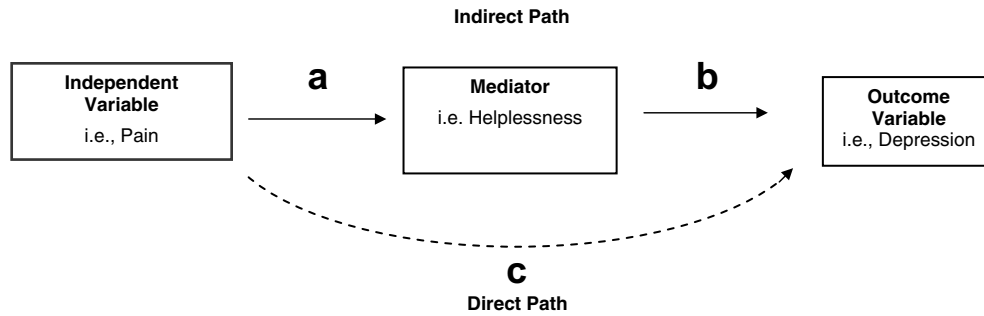


Fig. 1. Conditions for mediation, Baron and Kenny (1986): more than one causal path feeds into the outcome variable: the direct impact of the independent variable (Path c) and the impact of the mediator (Path b). There is also a path from the independent variable to the mediator (Path a). A variable functions as a mediator, the active mechanism through which the independent variable influences the outcome variable, if the following conditions are met within regression analyses: (1) the independent variable independently predicts the outcome variable (Path c), (2) the independent variable independently predicts the proposed mediator (Path a), (3) the proposed mediator independently predicts the outcome variable (Path b), and (4) the relationship between the independent variable and the outcome variable (Path c) becomes non-significant when the contribution of the proposed mediator is entered into the regression equation.

($SD = 1.26$) versus 4.63 ($SD = .82$), reported by Nielson and Jensen (2004). Finally, functional disability (SF-36) in the current sample, with a mean of 40.03 ($SD = 22.24$), was slightly lower than in a study by Epstein and colleagues (Epstein et al., 1999), which reported a mean score of 45.5 ($SD = 24.4$).

5.2. Intercorrelations among variables

The criterion measures, self-reported depression and observer-rated depression, were highly correlated ($r = .76, p < .01$) as were the proposed mediators, helplessness and loss ($r = .73, p < .01$). A combined criterion measure of depression, comprised of the sum of the standardized scores of the self- and observer-reported measures, was used in the final regression analyses to avoid redundancy of separate regressions with two highly correlated criterion variables. The standardized depressive symptom variable had an internal consistency of $\alpha = .92$ and met all assumptions of regression. Helplessness and interference were kept as separate variables in Model 2, based on theoretical assumptions of the model.

All variables in the proposed models were significantly correlated at $p < .05$. The combined depressive symptom criterion was moderately and positively correlated with all predictors in the model and was most strongly associated with the proposed mediators, helplessness and loss, followed by pain and perceived physical disability. Of the predictors, pain was also most strongly positively correlated with the proposed mediators, loss and helplessness, followed by physical disability, which was also most strongly and positively related to loss. Of the demographic variables, only employment status (dichotomized for unemployed versus employed) was significantly correlated with the combined depressive symptom criterion; unemployment was associated with higher depression. Tables 1 and 2, respectively, present

means and standard deviations, and correlations for model variables.

5.3. Test of Model 1

This model evaluated whether loss would mediate the relationship between disability and depression. In the first regression, physical disability accounted for 17% of the unique variance in loss ($t = -4.81, p < .001$), after controlling for demographic variables. In the analysis predicting depression, after removing the effects of demographic variables, physical disability uniquely

Table 1
Means, standard deviations and ranges for predictors, and criterion variable

Variable	<i>N</i>	Mean	<i>SD</i>	Range
<i>Predictors</i>				
Pain ^a	80	0.00	2.48	−4.88 to 5.25
FIQ	80	60.10	21.80	12 to 98
MPQ	80	31.52	11.03	8 to 59
MTPS	80	1.63	0.43	0.67 to 2.78
Functional disability	80	40.03	22.24	0 to 90
Helplessness	80	16.36	4.01	7 to 23
Interference	80	4.16	1.26	0.89 to 6
<i>Criterion</i>				
Depression ^b	80	0.00	1.88	−3.84 to 4.21
CES-D	80	24.35	11.49	1 to 51
SIGHD	80	21.17	7.29	6 to 35

Note. FIQ, Subscale of the Fibromyalgia Impact Questionnaire; MPQ, Pain Rating Index (RV) of the McGill; MTPS, Manual Tender Point Survey – Pain Rating; CES-D, Center for Epidemiological Studies Depression Scale; SIGHD, Standardized Hamilton Rating Scale – Depression.

^a This variable reflects a composite score of three standardized pain measures: Pain Rating Index (RV) of the McGill, Pain Subscale of the Fibromyalgia Impact Questionnaire, and Manual Tender Point Survey – Pain Rating.

^b This variable reflects a composite score of two standardized depression measures: Center for Epidemiological Studies Depression Scale and Standardized Hamilton Rating Scale – Depression.

Table 2
Correlations among variables in the model

	1	2	3	4	5	6
1. Depression	–	.40**	.54**	.48**	.30**	.37**
2. Pain		–	.54**	.64**	.49**	.27*
3. Helplessness			–	.73**	.43**	.35**
4. Loss				–	.55**	.40**
5. Disability					–	.26*
6. Unemployment						–

Note. Depression, combined depression score of Center for Epidemiological Studies Depression Scale and Standardized Hamilton Rating Scale – Depression; Pain, combined pain score of Pain Rating Index (RV) of the McGill, Pain Subscale of the Fibromyalgia Impact Questionnaire, and Observer-rated Tender Point Pain Scale; Helplessness, Rheumatology Attitudes Index – Helplessness Subscale; Loss, West Haven-Yale Multidimensional Pain Index – Interference Subscale; Disability, Medical Outcome Studies SF-36 – Physical Functioning Subscale; Unemployment, unemployment.

* $p < .05$.

** $p < .01$.

Table 3
Summary of hierarchical regression analysis for Perceived Physical Disability and Interference as predictors of combined depressive symptoms criterion ($N = 80$)

Variable	B	$SE\ B$	β	sr^2
Step 1				
Unemployment	1.36	0.54	.30*	0.07
Step 2				
Unemployment	1.17	0.53	.26*	0.05
Physical Disability	0.22	0.01	.25*	0.04
Step 3				
Unemployment	0.78	0.53	.17	0.02
Physical Disability	–0.00	0.01	–.07	0.00
Interference	0.55	0.20	.37**	0.07

Note. Overall $R^2 = .32$ ($p < .01$). $R^2 = .19$ for Step 1 ($p > .05$); $\Delta R^2 = .04$ for Step 2 ($p < .05$); $\Delta R^2 = .07$ for Step 3 ($p < .01$).

* $p < .05$.

** $p < .01$.

accounted for 4% of the variance in depression scores ($t = -2.10$, $p < .05$). Interference, the proposed mediator, was entered on the next step, controlling for the direct effect of physical disability. On this step, only loss ($t = 2.68$, $p < .01$) was significantly related to depressive symptoms, uniquely accounting for 7% of the variance. The overall model explained 32% of the variance in depression scores, $F(12, 67) = 2.64$, $p < .01$. The entry of loss attenuated the contribution of physical disability, causing it to be non-significant at this step ($t = -.55$, $p > .05$). A Sobel test (1982) of the significance of the indirect effect of physical disability on depression via loss indicated that loss accounted for the influence of physical disability on depression, $Z = 2.25$ ($p < .05$). The foregoing analyses met the criteria for determining loss as a mediator between disability and depression (Baron and Kenny, 1986). Table 3 presents a summary of the regression analysis. See Fig. 1 for beta weights,

significance levels, and squared semi-partial correlations for variables in the derived model.

5.4. Test of Model 2

The second model examined whether condition-specific helplessness and loss would mediate the effects of pain on depression. Since the previous model determined that loss fully mediated the effects of disability on depression, the second model analyzed the contribution of loss to depression with pain as the predictor and disability controlled. In these analyses, the effects of demographic variables and disability were removed before examining pathways from pain to mediators and the effects of pain on depression scores. In examining the effects of pain on mediators, pain accounted for 14% of the variance in helplessness ($t = 4.22$, $p < .001$), and 12% of the variance in loss ($t = 4.49$, $p < .001$). As predicted, greater pain was associated with higher helplessness and greater loss. Then the direct effect of pain on depressive symptoms was assessed. After removing the effects of demographic variables and disability on the first step, pain uniquely accounted for 6% of the variance in depression ($t = 2.60$, $p < .05$) with the model predicting 31% of the overall variance in depression, $F(12, 67) = 2.59$, $p < .01$. When mediating variables were entered on the following step, only helplessness ($t = 2.68$, $p < .01$) was uniquely related to depressive symptoms. Helplessness accounted for 6% of the unique variance in depression, with the overall model explaining 41% of the variance in depression scores, $F(14, 65) = 3.22$, $p < .01$. Loss had no independent relationship with depression ($t = -.16$, $p > .05$) when it competed with helplessness even though helplessness and loss were highly correlated ($r = .73$, $p < .01$) and loss was significantly correlated with depression ($r = .48$, $p < .01$). Since the contribution of pain became non-significant when the proposed mediators were entered into the equation ($t = 1.00$, $p > .05$), and helplessness was significantly related to the criterion, helplessness met the criteria of mediation according to Baron and Kenny (1986). A Sobel (1982) test to assess the significance of the indirect effect of pain on depression via the proposed mediator indicated that helplessness accounted for the relationship between pain and depression, $Z = 2.32$ ($p < .05$). See Table 4 for a summary of the regression analysis. See Figs. 2 and 3 for beta weights, significance levels, and squared semi-partial correlations for the derived model.

6. Discussion

The current study explored theoretically and empirically based mechanisms that contribute to depressive symptoms in FM patients. The goal of the research was to address whether illness cognitions associated with

Table 4
Summary of hierarchical regression analysis for variables predicting combined depressive symptom criterion ($N = 80$)

Variable	<i>B</i>	<i>SE B</i>	β	<i>sr</i> ²
Step 1				
Unemployment	1.17	0.53	.26*	0.05
Physical Disability	0.22	0.01	.25*	0.04
Step 2				
Unemployment	0.89	0.52	.19	0.02
Physical Disability	-0.01	0.01	-.11	0.00
Pain	0.24	0.09	.32*	0.06
Step 3				
Unemployment	0.65	0.50	.14	0.01
Physical Disability	-0.00	0.01	-.06	0.00
Pain	0.10	0.10	.13	0.00
Helplessness		0.04	.01	0.42**
Interference	-0.04	0.27	-.03	0.00

Note. Overall $R^2 = .41$ ($p < .01$). $R^2 = .24$ for Step 1 ($p < .05$); $\Delta R^2 = .06$ for Step 2 ($p < .05$); $\Delta R^2 = .09$ for Step 3 ($p < .01$).

* $p < .05$.

** $p < .01$.

FM would act as mediators in the relationship between the physical aspects of FM and depression. A major assumption of this research was that cognitive meanings associated with having FM, such as helplessness or loss,

would play a significant role in explaining depression, independent of physical aspects of the condition, such as pain or limited physical functioning. Two models examined the mediational roles of helplessness and loss in explaining depressive symptomatology. The first model was to examine the role of loss in explaining the link between disability and depressive symptomatology in FM. The second model examined the mediational roles of helplessness and perceived loss simultaneously in explaining the relationship between pain, the primary symptom of the condition, and depression, controlling for basic physical disability.

6.1. Loss as a mediator

As patients with FM experience significant functional disability (Epstein et al., 1999), the first model examined the relationship between disability and depressive symptoms. A key distinction was made in this model between actual loss of function, measured by physical disability, and perceived loss, assessed by the degree to which participants perceived FM as interfering with performance in key role domains. Initial tests of the model confirmed that physical disability due to FM, encompassing such activities as dressing, walking, bathing, and climbing

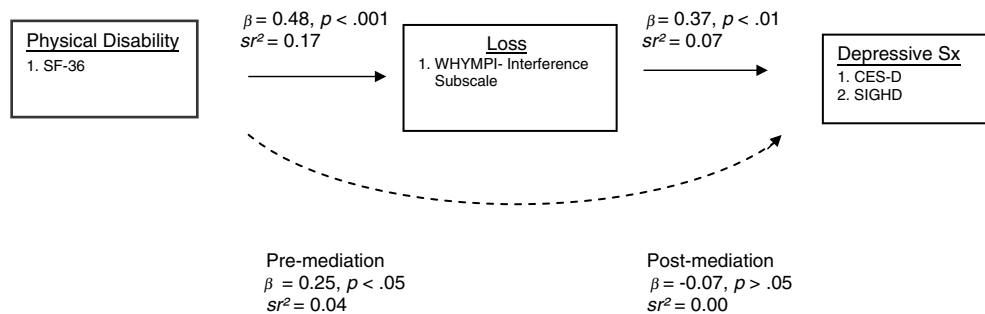


Fig. 2. Path analytic model: the relationship between physical disability and depressive symptoms mediated by loss.

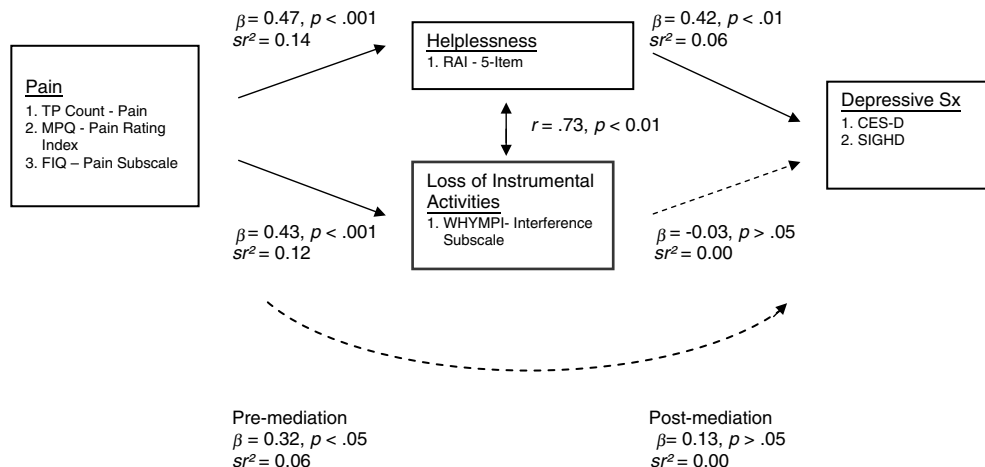


Fig. 3. Path analytic model: the relationship between FM pain and depressive symptoms mediated by helplessness and loss.

stairs, was a significant predictor of depressive symptoms, after controlling for demographic variables. Loss of basic physical functioning, along with unemployment, explained 21% of variability in depression scores. However, further tests of the model showed that loss of role performance in key areas of life, such as household activities, work, or significant family and social relationships, made a greater contribution to the prediction of depression, compared to loss of basic physical functioning. In fact, physical disability had no association with depression after taking into account the contribution of perceived loss. With loss of key role performance added to the model, the analysis accounted for 32% of the variance in depression. These findings demonstrate that limitations in physical functioning do not directly lead to mood disturbance in these patients. Rather, loss in culturally and personally valued aspects of role functioning accounted for this relationship. The results of the current study are consistent with findings in other pain populations, such as rheumatoid arthritis, in which loss of valued activities has been shown to play a key role in explaining depressive symptomatology (Katz and Yellin, 1994, 1995, 2001).

6.2. Helplessness as a mediator

The second model simultaneously examined helplessness and loss as independent mediators of the relationship between pain and depression in FM, to extend the findings of previous research on the role of helplessness in explaining the link between physical or functional aspects of FM and depressive symptomatology (Nicassio et al., 1995, 1999). When entered along with loss into the regression, helplessness fully mediated the relationship between pain and depressive symptoms, and demonstrated a unique influence on depressive symptoms over and above the contributions of unemployment, pain, and functional impairment, uniquely accounting for 6% of the variance in depressive symptoms. Although loss of key role performances was a significant positive predictor of depression and a mediator of the disability–depression relationship, loss did not provide a unique contribution to the prediction of depressive symptoms when it competed with helplessness in the regression equation.

Similar levels of interference were obtained in the current study as in the study by Maxwell and colleagues (Maxwell et al., 1997) in their sample of low back pain patients. However, the current results in an FM population were not consistent with studies that demonstrated independent mediation of helplessness and interference using the WHYMPI – Interference Subscale in other pain conditions, including trigeminal neuralgia, tendonitis, herniated disc, rheumatoid arthritis, and low back pain (Rudy et al., 1988; Maxwell et al., 1997).

Helplessness appears to be an especially critical factor in explaining depressive symptoms in FM. It is possible that the uncertainty of the etiology, disease course, and treatment of FM adds to the stressful nature of this condition and makes the construct of helplessness particularly relevant to understanding its psychological impact. While this was the first study to examine the conjoint contributions of loss and helplessness to depression in FM, it is possible that the constructs of condition-specific helplessness and loss are not independent mediators of depressive symptoms, but may be causally linked. As proposed by Williams (2003), performance loss in areas such as employment, household, social and recreational aspects of life may result in an appraisal of diminished coping ability and perceived helplessness as a final pathway to the development of depressive symptoms. Alternatively, helplessness may be the precipitating factor, leading to more passive coping responses (Nicassio et al., 1995), withdrawal from previous levels of activity and social interaction, and thus, greater role loss. Behavioral manifestations of helplessness may also strain interpersonal and work relationships, potentially exacerbating role loss. In this scenario, loss would mediate the relationship between helplessness and depression. Future research is needed to address these potential relationships using longitudinal methodologies. Despite the need for such work, the most parsimonious conclusion from these data, however, is that a sense of helplessness to control FM overrides the importance of loss as a factor in explaining depressive symptoms.

The use of combined self-report and observer-report measures to assess pain and depression was a significant strength of this research. Previous studies that assessed both helplessness and interference in the same regression model relied solely on self-report measures (Rudy et al., 1988; Maxwell et al., 1997). Relationships among constructs in these studies may have been inflated due to common method variance or distorted by self-report and memory biases. The methodology used in this study more conclusively highlighted the importance of helplessness in the pain–depression link within fibromyalgia with these methodological improvements. A limitation of the current study was the use of a cross-sectional design that prevented a definitive analysis of the pain–depression relationship, including the directional contributions of helplessness and loss to depressive symptomatology. Prospective studies are necessary to clarify these results as it is very important to determine whether perceptions of loss and helplessness precede the development of depression or whether they are sequelae of being depressed.

7. Clinical and theoretical implications

Although more research is needed to fully describe the unique psychological constructs most salient to the experience of FM, the current study illustrates the importance

of examining the meanings that patients ascribe to the experience of having FM. In particular, meanings associated with helplessness and/or loss of control should constitute the focus of clinical work in managing mood disturbance in FM and attenuating the functional impact of this disorder. Interestingly, however, the preponderance of non-pharmacological treatment research for FM has emphasized the role of exercise and behavioral strategies to minimize pain, stress, and fatigue (Goldenberg et al., 2004; Rossy et al., 1999). Depression has not been a principal target of these interventions despite lifetime prevalence rates of depression that have reached or exceeded 50% in some studies (Triadafilopoulos et al., 1991; Hudson et al., 1992). We have little evidence that such interventions are effective for treating FM depression. Moreover, depressive symptoms may not decrease even if physical symptoms, such as pain and fatigue, improve. Based on the current data, one could expect such a result if treatments do not address or manage patients' negative beliefs about FM.

Thus, it is important to evaluate illness meanings, such as helplessness, within the context of providing clinical care to FM patients. Administering the RAI and asking patients to clarify their responses may lead to a more complete awareness of the meaning that patients ascribe to FM that asking about pain or disability alone would not achieve. This information can then aid the clinician in designing interventions that ameliorate negative, dysfunctional meanings. Different approaches may be useful, depending on the factors contributing to helplessness in individual cases. For example, helplessness may result from faulty information about FM, poor social support, limited coping skills, a history of unsuccessful or misdirected efforts to obtain medical diagnosis and effective treatment, or dispositional traits, such as dependency or pessimism. These factors suggest the potential efficacy of a range of approaches involving patient education, behavioral and/or cognitive-behavioral strategies, and social support techniques. The clinician may thus select interventions rationally without assuming that any one approach would be appropriate for managing illness meanings across all patients.

Importantly, this research has clearly demonstrated that the construct of illness meaning is highly relevant to understanding depressive symptoms in FM. The findings of this study support the need for developing and testing psychosocial interventions that more directly target patients' perceptions and belief systems about FM and their significance for quality of life and mood disturbance.

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