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SELF-EFFICACY AND FIBROMYALGIA: A POSSIBLE SCREENING DEVICE FOR REFERRING PATIENTS TO PAIN CLINICS

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ABSTRACT

SELF-EFFICACY AND FIBROMYALGIA: A POSSIBLE SCREENING DEVICE FOR REFERRING PATIENTS TO PAIN CLINICS

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The purpose of this study was to develop and test the validity and reliability of a measure of self-efficacy designed to measure fibromyalgia patients' beliefs in their ability to perform pain, stress and sleep management techniques, and the extent to which they believe applying those techniques will result in a reduction in fibromyalgia symptoms. The content validity was based on the responses of 14 raters who were asked to indicate whether or not they believe items were measuring self-efficacy expectations (section 1) or outcome expectations (section 2). All 30 items in section 1 and all 24 items in section 2 met the requirement of 85% agreement and were retained. A total of 72 fibromyalgia patients (69 females and 3 males) completed all of the measurements included in the study. Measures of internal consistency, the split-half reliability and measures of concurrent, divergent and convergent validity were based on the responses of those 72 subjects. With the removal of two items from self-efficacy expectations section, the internal consistency is .89 and with the removal of one item from the outcome expectations section, the internal consistency is .88. The split-half reliabilities were .93 and .90 for the self-efficacy and outcome expectation sections respectively. Correlations between self-efficacy expectations (SE) and outcome expectation (OE) sections and measures of self-esteem, health locus of control and conscientiousness are moderate to low, indicating good divergent validity. Correlations with the Arthritis Self-Efficacy Scale are moderate, but significant, indicating that the two measurements are related, but not so strongly related that they are likely to be measuring the same thing. Correlations are highest between the SE section of the Fibromyalgia Self-Efficacy Measurement (FSEM) and the total score on the Arthritis Self-Efficacy Scale. The results of a multivariate regression analysis designed to examine the concurrent validity of the FSEM indicate that the current scores on the FSEM are predictive of current levels of depression, anxiety and somatization and active versus passive coping styles. The SE section is a better predictor of psychosocial impairment than is the OE section. The OE section is most predictive of reported use of specific types of coping strategies and is more predictive of physical impairment scores on the Sickness Impact Profile than is the SE section. Implications of these findings and suggestions for future research are discussed.

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CHAPTER 1

INTRODUCTION

Fibromyalgia syndrome (FS) is a chronic nonarticular (soft tissue) rheumatic disorder characterized by widespread musculoskeletal pain and aching, stiffness and fatigue with regions of localized tenderness (tender points). These tender points are constant within individuals and are consistent in location across patients (Klinefelter, 1972; McCain and Scudds, 1988). The majority of FS patients also report having disturbed sleep with the most frequent complaint being a feeling of tiredness upon waking (nonrestorative sleep) along with intensification of pain and stiffness upon waking and feelings of tiredness during the day (Campbell, Clark, Tindall, Forehand, and Bennett, 1983; Moldofsky, Scarisbrick, England and Smythe, 1975). Other frequently reported symptoms include: tension and/or migraine headaches; irritable bowel syndrome; subjective swelling of the hands and fingers; paresthesias and numbness; Raynaud's phenomenon; sicca symptoms (dry mouth and eyes); dysmenorrhea; reticular skin pattern; skin sensitivity; weight gain despite decreased appetite; psychological disturbance, particularly depression and anxiety; poor aerobic fitness; and poor work tolerance (Bennett, 1989; Cinque, 1989; Layfer, 1985; McCain & Scudds, 1988; Wolfe, 1989, Wolfe, 1986; Yunus, Masi & Aldag, 1989).

Because no medications have been found to provide complete relief of the symptoms of pain and fatigue associated with the disorder, fibromyalgia patients are primarily responsible for their own cognitive and behavioral management of their symptoms. This population has been shown to be a heterogeneous group in terms of their responses to psychological measures. The present study is designed to explore the possibility that the patients' beliefs in their ability to manage the symptoms may explain part of the variance this group has shown on measures of psychological adjustment. If a relationship is found between a patient's beliefs in his/her ability to carry out pain, stress and sleep management techniques and the patient's psychological adjustment and ability to cope with the disorder, then a measure of those beliefs could be a useful way to assess which fibromyalgia patients could benefit from the services of a pain clinic. In addition, it could be useful in identifying which skills the person believes he or she is lacking.

Background

Symptoms of FS are worsened by exposure to cold temperatures, drafts, humid weather, weather change, emotional stress (including that associated with unresolved conflicts and decisions), unaccustomed exertion, over-activity, noise, bright lights, anxiety, poor sleep, alcohol, menstrual period, sedentary state, obesity, and lack of physical conditioning (Bennett, 1981; Smythe, 1979, 1972; Yunus, Masi, Calabro, Miller & Feigenbaum, 1981). Improvement in symptoms occur with hot, dry weather; a hot bath or shower; local application of heat; massage; gentle stretching exercise; and rest (Bennett, 1981; Campbell, Clark, Tindall, Forehand & Bennett, 1983).

Fibromyalgia occurs more frequently in women than in men. Reports regarding the percentage of men in this population vary from 5% to 25%, with 15% cited most frequently (Felson, 1989; McCain & Scudds, 1988; Yunus, 1988; Yunus & Aldag, 1991). Recent studies indicate that the FS symptoms are similar in men and women (Hoogland, Katz & Clauw, 1992; Yunus & Aldag, 1991), with the possible exception that pain severity may be more influenced by anxiety in women (Yunus & Aldag, 1991). Although the age of onset and presentation is generally between the ages of 20 and 40 years; with a peak age of 35 (Cinque, 1989; McCain & Scudds, 1988), it also has been reported to occur in children, with boys showing lower levels of tenderness as measured by a dolorimeter than did girls (Buskila, Press, Gedalia, Klein, Neumann & Sukenik, 1991). It is rare for the onset of FS to occur after age 60 years (Felson, 1989).

Prevalence

Fibromyalgia syndrome is reported to be the third most common condition seen in rheumatology practice following rheumatoid arthritis (RA) and osteoarthritis (OA) which constitute 14% and 13% of rheumatology patients, respectively (Dinerman, Goldenberg, & Felson, 1986). It is suggested that FS affects from 2 to 15% of routine rheumatology patients (Hester, 1982; Wolfe & Cathey, 1983). In one rheumatic disease clinic, 20% of new patients were found to have FS (Yunus, Masi, Calabro, Miller and Feigenbaum, 1981). A 1977 survey by the American Rheumatism Association Committee on Rheumatologic Prevalence administered to four rheumatologists over a one month period found that 7% of new patients fit the diagnosis of FS (Wolfe & Cathey, 1983). Wolfe and Cathey (1983) examined 1,473 consecutive new patients at a rheumatic disease outpatient practice and found 3.7% had primary fibromyalgia (Fibromyalgia without other concomitant rheumatic disorders) and 10.9% were found to have fibromyalgia concomitant with other rheumatic disorders.

Fibromyalgia has also been reported to occur in 5-6% of patients attending general medical and family practice clinics (Goldenberg, Simms, Geiger, Komaroff, 1990). Given reports that physicians who are not in the field of rheumatology do not know of, or neglect, FS, many patients may undergo unnecessary, expensive diagnostic procedures and hospitalizations (Niskikai, 1972; Smythe 1986; Yunus, Masi, Calabro & Shah, 1982). One study demonstrated that hospitalization was much less common after diagnosis than before diagnosis (Cathey, Wolfe, Kleinheksel & Hawley, 1986). Goldenberg (1987) reported there had been 6 million Americans diagnosed with FS. The lack of awareness, or neglect, of this syndrome by general practitioners, orthopedic surgeons, neurologists, internists and psychiatrists suggests that the condition is undetected in many others.

Disability

Musculoskeletal disorders are the second leading cause of work disability (Cathey, Wolfe, Kleinheksel & Hawley, 1986). Of those disorders, FS has been found to be a common source of disability (Goldenberg & Broduer, 1982; Hudson, Pliner, Hudson, Goldenberg & Melby, 1984; Kalyan-Raman, Kalyan-Raman, Layfer, 1985; Moldofsky, Scarisbrick, England & Smythe, 1975; Yunus & Masi, 1984). Again, this condition may be an underestimated cause of chronic disability because of the fact that many physicians are not educated in the recognition and treatment of the disorder (Antonelli & Lewis, 1988).

In a recent study of 307 FS patients, 60% were employed. Sixty-five percent of those working felt that their illness had affected their ability to work effectively. Fifty-eight percent of those who were not working felt they were disabled from FS, but only 9% were receiving disability compensation. The level of activity of these patients correlated with coping strategies, helplessness, and self-esteem (Goldenberg, Nadeau & Kaplan, 1992).

Researchers have frequently made comparisons of FS and RA because RA is a disease known to be associated with disability. In a study by Cathey, Wolfe, Kleinheksel and Hawley (1986), it was found that despite the fact that their FS subjects reported impairment in functional ability, only 6.3% reported being disabled. Those who were employed averaged 40.1 hours of work per week which is above the national average of 35 hours per week. The mean days of work lost due to illness was 9.8. This mean was reported to be positively skewed due to several subjects who had lost more than 30 days of work. The average of 9.8 days lost is reported to be similar to that found in patients with other musculoskeletal disorders. In other studies, FS patients were found to miss work more frequently than RA patients. One study found that 13% of FS patients missed at least half the days of a given month. FS patients were also more likely to report difficulty in performing work accurately and completely, and required more frequent rest periods and task modifications (Mason, Simms, Goldenberg & Meenan, 1988). In a survey of 176 FS patients, one study found that 30% reported changing their jobs, while 17% quit work due to FS (Cathey, Wolfe, Kleinheksel & Hawley, 1986). Russell, Fletcher, Tsue, and Michalek (1988) found that pain severity was 10% higher in FS patients in comparison to those with RA. Disability measured by the Health Assessment Questionnaire was slightly greater for RA, while disease severity measured by the Quality of Well Being Scale was the same for the two groups. Robbins, Kirmayer and Kapusta (1990) found that FS patients reported being significantly less disabled than patients with

RA on dexterity and activities of daily living such as bathing, dressing and using the toilet. FS patients were found to be similarly disabled in comparison to RA patients with respect to mobility; physical activities such as walking and bending; activities necessary to run a household such as cooking, shopping, and cleaning; and social activities.

In addition to studies that have looked at self-reports of disability, some studies used more objective measures. In a study using of a computerized work simulator, patients were asked to perform five tasks which involve the musculoskeletal system. The 23 FS patients obtained total work scores that were only 53% of those found for normal subjects. Forty-three to 58% of the FS patients were unable to complete all of the tasks. The results of this study indicate that physical performance may be impaired in FS patients (Cathey, Kleinheksel, Miller, Pitetti & Wolfe, 1988). Jacobsen and Danneskiold-Samsoe (1987) found additional evidence for functional impairment. They studied the isometric and isokinetic strength of knee extension in 15 FS patients and compared them to normal control subjects. They found that isometric muscular strength was 58-66% lower in FS patients, while isokinetic muscular strength was 41 to 51 % lower than that found in control subjects.

History

Historically, fibromyalgia has been called fibrositis, fibromyositis, myofascitis, myofibrositis, epidemic myalgia, muscular rheumatism, nonarticular rheumatism, painful myosis, psychogenic rheumatism, occupational myalgia, interstitial myofascitis, neurasthenia, tension myalgia, myofascial pain syndrome, and rheumatic pain modulation disorder (Smythe, 1986; Uveges, 1987; Weinberger, 1977; Yunus, Masi, Calabro & Shah, 1982).

The term fibrositis was first introduced by Sir William Gower in 1904. He suggested that the back pain associated with lumbago is a result of inflammation of the fibrous structures of muscles, nerves and fascia. In the same year, Stockman reported on fibrositis nodules. He described an infiltration of mononuclear cells in the muscle tissues. He concluded that it is a condition of chronic inflammation of white fibrous tissue (Smythe, 1972). Subsequent studies by others failed to find signs of inflammation, leading to the rejection of the inflammation hypothesis.

Fibrositis was, for the most part, neglected by rheumatologists between 1953 and 1972. This may have been in reaction to Graham's published report in which fibrositis syndrome was described as the most controversial condition in the rheumatic field. Graham also suggested that fibrositis was not a disease, but a syndrome brought about by a variety of widely separate conditions (Hadler, 1986; Klinefelter, 1972).

Historical Developments in Diagnostic Criteria

The reintroduction of fibrositis in the literature occurred with Smythe's (1972) suggested diagnostic criteria for the disorder. Smythe suggested the following obligatory criteria for the diagnosis of fibrositis: (1) subjective aching of more than 3 month's duration, (2) subjective stiffness of more than 3 month's duration, (3) local point tenderness, (4) point tenderness in two other sites, and (5) normal erythrocyte sedimentation rate (ESR), serum glutamic-oxolacetic transaminase (SGOT), rheumatoid factor test, antinuclear antibody factor (ANF), muscle enzymes and sacroilliac films. All of the above must be present for the diagnosis according to Smythe. In addition, he introduced three minor criteria, including: chronic fatigue, emotional distress and poor sleep accompanied by morning stiffness.

Following Smythe's introduction of diagnostic criteria, other researchers have suggested their own criteria. From 1979 to 1985, published studies were found to have used six different sets of criteria. These criteria differed primarily in the numbers of tender points required and the importance placed on other symptoms such as sleep disturbance, morning stiffness, modulation of symptoms by environmental factors and anxiety.

The diagnostic criteria of Yunus, Masi, Calabro, Miller, and Feigenbaum (1981) indicated generalized aches and pain or prominent stiffness involving three or more sites (preferably at least five tender points) for at least three month's duration in the absence of secondary causes. In addition, at least four of the following factors should be present: modulation of symptoms by physical activity or weather factors, aggravation of symptoms by anxiety or stress, poor sleep, general fatigue or tiredness, chronic headache, irritable bowel syndrome, subjective swelling and numbness. Wolfe, Hawley, Cathey, Caro and Russell (1985) suggested that no combination of questions and tender point count were better than the tender point count alone. Others have suggested that a combination of widespread musculoskeletal pain, high tender point count, and nonrestorative sleep are sufficient criteria for the diagnosis of FS.

The refinement of the diagnostic criteria for fibromyalgia was accompanied by greater differentiation between FS and myofascial pain syndrome (MPS). In the past, MPS was considered by some to be synonymous with fibrositis (Bennett, 1989). MPS is a regional pain syndrome, as opposed to a widespread or generalized syndrome (Campbell, 1989). The following criteria are required for the diagnosis of MPS: (1) the presence of one or more "trigger points"; (2) the presence of referred pain patterns which are specific to the active or latent trigger points; and (3) a local twitch response in the muscle. Additional commonly reported features include decreased range of motion and muscle weakness in affected muscles and associated joints (Scudds, Trachsel, Lackhurst & Percy, 1989).

The main similarity between FS and MPS is the presence of muscle pain and muscle tenderness on palpation (Yunus, Kalyan-Raman & Kalyan-Raman, 1988). A distinction is made between "tender points" and "trigger points." Tender points are distinct areas of tenderness found in precisely predictable sites. Location of those tender points are consistent in patients of widely differing shapes and age (Smythe, 1979). Palpation of tender points results in localized tenderness. Palpation of the trigger points of MPS causes referred pain to other areas beyond the site of palpation. Palpation of these trigger sites also causes what has been referred to as the jump sign and causes a local twitch response in the muscle (Smythes, 1979). The treatment of trigger points by injection of local anesthetic into the trigger point and application of ethyl chloride spray has been found to provide relief. Such treatment of tender points has not been shown to be helpful (Hadler 1986). Muscular stress, including mechanical trauma, may play a role in the etiology of MPS but trauma has not been shown to be a definite factor in FS (Yunus, Kalyan-Raman & Kalyan-Raman, 1988). Given the differences in the treatment and etiology of MPS and FS, the distinction between the two disorders is very important. As recently as 1989, some authors seem to have continued to fail to take into consideration the difference between the two disorders. Littlejohn (1989) studied a group of patients in Australia who suffered from "localized fibrositis syndrome." The characteristics of the "localized fibrositis" seem to more closely fit the criteria for MPS, and it would be important to be cautious in generalizing Littlejohn's suggestions and findings to those who truly fit the criteria of fibromyalgia syndrome.

There are also similarities between chronic fatigue syndrome (also referred to as chronic Epstien-Barr viral infection) and FS. As with FS, there are no definitive laboratory tests confirming the diagnosis of chronic fatigue syndrome (CFS). Both syndromes include generalized fatigue, myalgia, and sleep disturbance in their diagnostic criteria. The chronic fatigue syndrome diagnostic criteria also include the presence of low grade fever, pharyngitis, and tender lymph nodes. These variables are not included among the diagnostic criteria of FS. In addition, FS criteria include the presence of at least 5 tender points, which is not included in the diagnostic criteria of CFS (Goldenberg, 1989; Goldenberg, Simms, Geiger & Komaroff, 1990; Wysenbeek, Shapira & Lieboric, 1991). This would seem to indicate that the distinguishing criteria for FS is the presence of tender points while the distinguishing criteria for CFS would be sore throat, low-grade fever, and tender lymph nodes. However, this conclusion is complicated by the fact that studies have indicated that some FS patients experience low-grade fever, frequent sore throats and/or tender lymph nodes, while some patients fitting the CFS criteria also have a sufficient number of tender points to fit the criteria for a diagnosis of FS (Buchwald, Goldenberg, Sullivan & Komaroff, 1987; Goldenberg, 1989; Matthews, Lane, Manu & Abeles, 1991).

There have also been conflicting opinions regarding the treatment of the disorders. For example, exercise intolerance has been suggested as a distinguishing feature of CFS (Zal & Facn, 1992) while aerobic exercise has been suggested as a possible factor alleviating FS symptoms. However, others have suggested exercise, particularly swimming and other water-based exercise, may provide relief from CFS symptoms as well (Klonoff, 1992). The distinction between CFS and FS is still not completely clear. At this time, the presence of the necessary number of tender points seems to be the most accurate diagnostic criterion for FS.

The recognition of the need for a standard set of criteria for the diagnosis of fibromyalgia syndrome led to a study involving 25 investigators. The specific purpose of the study, initiated in 1988, was to develop diagnostic criteria for fibromyalgia. The study involved recruitment of 558 consecutive rheumatology patients (293 with fibromyalgia and 265 controls) from 16 private practice and university centers in the United States and Canada. They examined 11 symptom variables (sleep disorders, fatigue, morning stiffness, anxiety, irritable bowel syndrome, frequent headache, Raynaud's phenomenon, SICCA symptoms, prior depression, paresthesias and "pain all over"); 10 modulating factors (noise, fatigue, stress, activity, anxiety, humidity, warmth, cold, poor sleep, and weather changes) and variables that were suspected to differ between FS patients and controls but had not yet been studied extensively, such as urinary urgency; dysmenorrhea; modulation factors involving weather, rest and working various numbers of hours; skinfold tenderness; reactive hyperemia; and reticular skin disturbance (Wolfe, Smythe, Yunus, Bennett, Bombardier, Goldenberg, Tugwell, Campbell, Abeles, Clark, Fam, Farber, Fiechtner, Franklin, Gatter, Hamaty, Lessard, Lichtbroun, Masi, McCain, Reynolds, Romano, Russell & Sheon, 1988, 1990).

In addition to developing criteria for diagnosis, Wolfe, Smythe, Yunus, et al. (1988) sought to determine whether or not the distinction between primary and secondary fibromyalgia is necessary. The importance of this distinction has changed over time.

Slocumb (1943) differentiated between fibrositis of unknown etiology from fibrositis which occurs in association with other conditions such as trauma or degenerative arthritis. Other diseases that have been suggested to predispose one to fibrositis include rheumatoid arthritis, systemic lupus erythematosus, polymyalgia rheumatica, viral hepatitis, influenza, and hypothyroidism (Bennett, 1981). The condition has been considered to be primary in the absence of any known underlying cause, and secondary in the presence of organic disease. Beetham (1979) believed that the distinction between primary and secondary fibrositis was misleading. In his view, primary fibrositis was always caused by a secondary or underlying disorder; in some cases, the secondary disorder was just not recognized. The implicit assumption was that treatment of its underlying cause would also lead to a decrease in symptoms of fibromyalgia. The term secondary suggests a causal link between the fibromyalgia and the underlying disease (McCain & Scudds, 1988). The concept of secondary has become questionable due to the discovery that successful treatment of RA does not necessarily result in a change in fibromyalgia symptoms. Fibromyalgia also can occur in RA patients whose RA symptoms are in remission. This has led to the suggestion that fibromyalgia, in the presence of other known disorders, be referred to as "concomitant" rather than secondary (Hench, 1986, 1989).

The results of the Multicenter Criteria Committee's study demonstrated that there were 15 or more painful regions in 51-60% of fibromyalgia patients versus 12-13% of control patients. The symptoms that were most characteristic of the fibromyalgia patients were fatigue, sleep disturbance, and morning stiffness (found in 73-85%). "Pain all over", paresthesias, headache, and anxiety were moderately common (45-69%). Irritable bowel syndrome, sicca symptoms, and Raynaud's phenomenon were found in less than 35% of the fibromyalgia patients. Fibromyalgia patients and control patients differed significantly ($p < .001$) on the above characteristics. Tender points were the most powerful discriminators between fibromyalgia patients and controls. The thirteenth tender point separated the patients and controls for those experiencing mild tenderness, while the sixth tender point separated the patients and controls for those experiencing moderate or greater degrees of tenderness. Waking up unrefreshed was the sleep disturbance that best identified fibromyalgia patients (Wolfe, Smythe, Yunus, et al., 1988, 1990).

The committee reduced the number of tender points for examination from 24 to 18. The new criteria require the presence of widespread pain and tenderness in 11 of 18 tender point sites. The designation of secondary fibromyalgia has been eliminated. Only 7.1% of the patients with fibromyalgia who meet the criteria will be misclassified (Wolfe, Smythe, Yunus, Bennett, et al., 1990).

Early studies found that fibromyalgia patients differed significantly from healthy controls both in the number of tender points and degree of tenderness at those sites, while they demonstrated similar results over control points. Control points are specific sites that have not been associated with pain in FS patients. These sites would be expected to be pain-free. This suggested that perhaps FS patients do not "hurt all over." A more recent study demonstrated that control site pain thresholds are about twice as high (half as tender) as fibrositic tender point thresholds. The control/fibrositic ratio (C/F) was 2.09 with 95% confidence levels of 1.87 and 2.31. Tender points may not only be useful in making an accurate diagnosis, they may also be useful in detecting exaggerating patients who would show too much tenderness at control sites and too little at the fibrositic sites. A pilot study in which three subjects were asked to fake tenderness, demonstrated that 2 of the 3 had C/F ratios of 1.2 or less, while the third faker had a ratio of 1.4. In the initial study, only 5% of fibromyalgia patients had ratios below 1.4. Even though there is still no definitive laboratory finding to verify FS, the tender point count and measurement of pain and tenderness at those points with the use of a dolorimeter appears to result in accurate diagnosis (Smythe, Gladman, Dagenais, Krashisi & Blake, 1982).

The etiology of FS is still unknown. Patients often identify an event which they believe may have been associated with the onset. Wolfe (1989) found that 95% of patients noted one or more events they felt were associated with the onset of their symptoms. Some of those events include: noninjurious automobile or work-related accident, illness, injury, emotional stress, muscle overload, and disturbed sleep (Campbell, Clark, Tindall, Forehand & Bennett, 1983; Bennett, 1981; Wolfe, Cathey, Klienheksel, Amos, Hoffman, Young & Hawley, 1984). Studies indicate that the two most commonly identified precipitating events were physical trauma and viral illness (Goldenberg, 1988; Goldenberg, Nadeau & Kaplan, 1992). Fifty-five percent of the patients in one study stated that their FS began with a viral illness (Buchwald, Goldenberg, Sullivan & Komaroff, 1987). While some have suggested that symptoms of FS are due to psychologically stressful situations, only one of nine subjects in a study of FS patients with periodic myoclonus described a premorbid event associated with the onset of their symptoms (Moldofsky, Tullis, Lue, Quance & Davidson, 1984). These results indicate that psychological disturbance is not a necessary factor contributing to FS. It may be sleep disturbance that contributes to the onset of symptoms. The results of these studies indicate that symptoms appear to be correlated with disparate events, and these events have not yet been shown to be causal. The results also suggest that it may be the sleep disturbance that often accompanies psychologically stressful situations that may be contributing to the cause of the symptoms.

Psychological Findings

There are several factors that have led to the hypothesis that psychological variables may be associated with FS symptoms. First, because there are currently no objective laboratory tests that can be used to definitively diagnose FS, a psychogenic etiology has been investigated (Moldofsky, Scarisbrick, England & Smythe, 1975). Second, FS symptoms are similar to those associated with depression (fatigue and sleep, appetite, and mood disturbance). Third, low doses of tricyclic antidepressants have been shown to be helpful in improving the quality of sleep in fibromyalgia patients (Carette, McCain, Bell & Fam, 1986).

Studies of psychological aspects of FS (to be described in greater detail in Chapter 2) have indicated that some FS patients experience anxiety and tend to worry (Uveges, 1987;

Elkins, 1984; Grant & Russell, 1982; Bennett, 1981). Others have found that some FS patients meet the criteria for depression (Moldofsky, Lue, Nataraja & Reynolds, 1992; Goldenberg, 1988; Wolfe, Cathey, Kleinheksel, Amos, Hoffman, Young & Hawley, 1984; and Payne, Leavitt, Garron, Katz, Golden, Glickman & Vanderplate, 1982), while some studies have failed to support the hypothesis that FS is a form of depression (Kirmayer, Robbins & Kapusti, 1988). In addition, studies have found some evidence for depression in FS patients have found it to be true in only a subgroup of patients (Payne, Leavitt, et al., 1982; Wolfe, Cathey, et al., 1984). Goldenberg (1988) found that although in comparison to other pain populations, FS patients were more likely to have had a diagnosis of depression at some time in their life; most of the diagnoses antedated the onset of FS by over one year. Only 26% reported being depressed at the time of onset.

Management

Management of Symptoms with Medication

Moldofsky, Scarisbrick, England and Smythe (1975) reported that FS is unresponsive to most medical and psychiatric therapies. By the time patients are diagnosed as having FS, they have generally already tried aspirin and other commonly used pain relievers with minimal relief (Bennett, 1981). Although some patients gain some benefit from salicylates, the large doses required for adequate relief produce symptoms of salicylism (Klinefelter, 1972). Nonsteroidal anti-inflammatory medications are also of little benefit (Bennett, 1981).

Of the medications used in the treatment of FS, tricyclic medications such as amitriptyline and cyclobenzaprine have been the most frequently studied. Although amitriptyline has been shown to be of some benefit in reducing the total myalgic scores, pain threshold and subjective pain reports (Carette, McCain, Bell & Fam, 1986; Goldenberg, 1989; Scudds, McCain, Rollman & Harth, 1989), some studies have pointed out that the clinical impact is less than satisfactory (Goldenberg, 1989). Amitriptyline was found to benefit only 25 to 37% of FS patients (Carette, McCain, Bell & Fam, 1986; Jaeschke, Adachi, Guyatt, Keller & Wong, 1991).

Cyclobenzaprine is another tricyclic medication that has been found to be of benefit to some FS patients (Campbell, Gatter, Clark & Bennett, 1984; Gatter, 1981; Reynolds, Moldofsky, Saskin & Lue, 1988). It has not been shown to relieve all of the symptoms of fibromyalgia. While it does affect the duration of sleep, some studies have shown that it does not alter sleep physiology, pain, fatigue, morning stiffness, and mood symptoms (Gatter, 1981; Reynolds, Moldofsky, Saskin & Lue, 1988). Other medications shown to provide partial relief of FS symptoms include: Ibuprofen and Alprozalam (Russell, Fletcher, Michalek, McBroom & Hester, 1988); temzepam, which is a benzodiazepine or mild tranquilizer (Hench, Cohen & Mitler, 1988); S-adenosylmethionine (Taconi, Vatale, Bombardier & Passero, 1987); phenylbutazone (Klinefelter, 1972); and chloropormazine (Moldofsky, Benz, Lue, Scarisbrick & Smythe, 1976).

Medication alone has been shown to be of only partial benefit in the treatment of FS symptoms. Because only about 23% of FS patients report remissions, and those who do experience remissions report that they are of short duration, it is important that physicians avoid prescribing addictive narcotics or analgesics that may have toxic effects with long-term use (Layfer, 1985; Wolfe, 1986).

Non-Medicinal Management of Symptoms

Some of the techniques that have been found to give temporary relief of symptoms are those that make use of modulating factors (heat, cold, stress, etc.) that have been reported by FS patients, they include: application of heat, massage, rest, vacations, and stress reduction (Yunus, 1988; Smythe, 1979). Behavioral techniques of biofeedback and relaxation training have been demonstrated to be somewhat efficacious (McCain, 1989),

The low level of physical fitness found in FS patients has led to studies of aerobic exercise as a possible treatment technique. Several recent studies have found that FS patients receive some benefits from aerobic exercises (Bell & Bailey, 1992; Clark, Burckhardt, O'Reilly, Campbell & Bennett, 1991; Klug, McAuley & Clark, 1989; McCain, Bell, Masi & Halliday, 1988). The mechanisms of the relief are not clear. It is clear that exercising patients report feeling generally better, but it is also clear that many of the symptoms are unaffected by exercise. McCain, Bell, et al. (1988) found that cardiovascular training improved both physician and patient global assessment scores, but there was no improvement in sleep quality, no reduction in the total body area affected, and no decrease in fatigue. Levels of psychological distress did lessen. This suggested to these authors that the psychological findings may have been a result of the socializing effects of meeting in a group setting. This has not yet been verified by comparing individually treated subjects to those exercising in groups. Klug, McAuley and Clark (1989) found that although exercise training produced no change in analog scores of pain, stiffness or fatigue; the ratings of severity of fibromyalgia indicated that the exercise group showed improvement, whereas the control group did not. The exercising subjects reported that, although their fibromyalgia symptoms did not improve, they were better able to tolerate their symptoms and accomplish their daily tasks. The evidence from these studies indicates that exercise is an important component in the treatment of FS. It is apparently very important that attempts be made to closely match the initial intensity, duration and frequency of exercise to the current tolerance level of the patient in order to enhance compliance and reduce the likelihood of injury.

Although psychological studies of FS patients began approximately 20 years ago, the cognitive-behavioral techniques and multidisciplinary approaches used in the treatment of other forms of chronic pain were not investigated until very recently. Studies have shown that cognitive restructuring, relaxation training, aerobic exercise and stress management training are useful in improving the psychological outcome variables and some of the physical symptoms (Strosberg, Buchan, James-Buchan & Thomas, 1988; Croft, Schollman & Silman, 1991: McCain, Nielson & Walker, 1991).

Problem

Researchers have been able to pinpoint diagnostic criteria for fibromyalgia, suggesting that it is a "real" diagnosable disease. Fibromyalgia affects many people, and individuals vary in the number and severity of symptoms and in their ability to adjust to having the disorder. They all experience "real" pain. So far, no cure or consistently effective pharmacological treatments have been found. As a result, fibromyalgia patients are, to a great extent, responsible for their own management of symptoms (Bennett, 1986). Some fibromyalgia patients are fortunate enough to have a physician who has taken the time to educate them and who has directed them toward pain clinics, physical therapists, or others who can provide them with skills in helping them manage pain, stress and sleep. However, many tell support groups that they were given a name for what they have, but no education on what it is and how to manage it. It is not unusual to encounter patients who report having experienced a great deal of relief after being given a name for their symptoms and to discover that it is not "all in their head", only to have that relief replaced with anxiety and depression. These patients report that after being told what they have, they are only told that they just need to learn how to live with it.

The early psychological studies of fibromyalgia patients were designed to attempt to establish psychological disturbance as an etiological factor. What was found in those studies is that some, but not all, fibromyalgia patients show some signs of psychological disturbance, especially in the form of anxiety and depression. This indicates that psychological disturbance is not a necessary etiological factor. For fibromyalgia patients, treatment is currently an issue of adjustment and coping rather than cure. Because of this, psychologists might serve this population better by moving the focus of study from one of placing blame to one of identifying characteristics and behaviors in patients that will distinguish those who cope and adjust well from those who experience difficulties in coping with, and managing, symptoms. By finding distinguishing factors, it may be possible to develop psychological treatments that will aid in their adjustment.

It is known that fibromyalgia patients are responsible for being actively involved in their treatment, particularly through participating in aerobic exercise and by using cognitive and behavioral techniques for managing stress, pain and sleep. This is due to the fact that medications have not been shown to be adequately effective in reducing fibromyalgia symptoms. Questions remain regarding the reasons why some fibromyalgia patients take active approaches toward coping with symptoms while others are more passive. It is also not clear why some patients become depressed and/or anxious, while others do not. It may be that anxiety and depression are often a response to having to take responsibility for their own treatment, while not believing they have the skills to do so. The fact that pain is affected by the external environment makes its management particularly challenging. In addition to managing pain, they have to manage a sleep disorder, stress and mood disturbance. Exercise is one of the most important ways of managing FS symptoms, however, it is often difficult for patients to get themselves to exercise when they are in pain. The management of time is also difficult because these patients tend to be chronically fatigued. In addition, symptom severity fluctuates from day to day. This can make it more difficult to accurately estimate the amount of time daily tasks will take. The fatigue can also interfere with the efficiency with which they can get things done. In addition, even mild stress will exacerbate symptoms.

Bandura's (1977) self-efficacy theory suggests that individuals will be persistent in their effort to implement skills when they believe they have the ability to perform those skills, and that doing so will result in a desired outcome. He also suggests that when individuals are in situations in which they do not believe they have skills adequate to gain the desired results, they will become anxious and will be less likely to persist in the face of adversity.

A measure of patients' self-efficacy beliefs regarding their ability to carry out behaviors necessary to manage the symptoms of FS may be useful in identifying those patients who are likely to have difficulty carrying out the skills (pain management, stress management, and sleep management skills) necessary to cope with and manage their symptoms. At the same time, a measure of self-efficacy may be useful in identifying the specific skills in which the person believes him-/herself to be deficient. Bandura suggests that those who show low self-efficacy regarding their ability to carry out a task will be more likely to respond to a need to perform the task with anxiety and depression. In addition, Bandura suggests that there are ways in which self-efficacy can be increased.

The present study was performed in order to develop an instrument designed to measure patients' self-efficacy regarding their ability to perform pain, stress and sleep managment techniques. Its purpose was to explore the possibility that self-efficacy theory may be useful in understanding why fibromyalgia patients may differ in their level of psychosocial adjustment to having the disorder. If it can be shown that self-efficacy does explain a significant amount of variance in fibromyalgia patients' level of depression and anxiety and in their tendency to use active versus passive coping strategies, it could be a useful tool for determining which fibromyalgia patients are at risk for having difficulty in adjusting to the disorder. It would have an advantage over merely measuring anxiety and depression directly, because it could also provide information about the confidence level of patients towards their ability to use techniques that are helpful in managing the symptoms.

CHAPTER 2

REVIEW OF THE LITERATURE

Fibromyalgia syndrome has been studied from both physiological and psychological perspectives. The lack of definitive diagnostic laboratory tests and the similarity of FS symptoms to those of depression has led to the psychological study of the disorder (Moldofsky, Scarisbrick, England and Smythe, 1975).

Psychological Literature

The initial focus of the psychological work related to fibromyalgia syndrome was on the distinction between psychogenic rheumatism (PR) and FS. There are characteristics of FS that are inconsistent with the diagnosis of PR. PR is characterized by imprecise symptoms. Patients report regions of pain rather than specific painful sites. FS symptoms are similar from patient to patient and the tender points are found in predictable and consistent locations. FS symptoms are also reproducible in individual patients from one examination to another. PR patients demonstrate difficulty in describing the characteristics of their pain. At times they use uncommon emotional and/or dramatic terms. FS patients describe specific complaints with a definite pattern. They report feeling stiff and unrested on arising in the morning with improvement with moderate activity. Aching and stiffness may also occur during the day following periods of inactivity or rest. PR patients report that no methods of treatment are useful in reducing symptoms while FS patients acknowledge that some forms of treatment provide at least partial, temporary relief from pain and other symptoms. For example, FS patients consistently report some relief after applying heat or from massage. PR patients are more likely to complain of having problems in other systems of the body while FS patients confine their complaints primarily to the musculoskeletal system. The most striking difference between these two groups is that FS patients report that their symptoms are affected by external factors such as weather changes and exercise, while PR patients are affected by internal factors such as changes in mood and emotions (Beetham, 1979;

Klinefelter, 1972, Reynolds, 1978; Smythe, 1972; Yunus & Masi, 1985; Yunus, Masi, Calabro, Miller & Feigenbaum, 1981).

Even though there are clear differences between the characteristics of PR and those of FS, there continued to be attempts to define a fibromyalgia personality. The most frequently cited literature is Smythe's (1985) attempt to identify characteristics of the fibrositis (fibromyalgia) personality. In those citations, others have tended to focus on Smythe's description of FS patients as being demanding and perfectionistic. However, Smythe also described these patients as also being caring, honest, committed, moral and industrious. These more positive characteristics have rarely been mentioned by those citing Smythe. Smythe also pointed out that FS patients are often effective in their chosen field of work and have unusual loyalty from employers and family and that they resent suggestions that they use their illness as a crutch. They drive themselves harder than most. Smythe suggests that the described characteristics are not abnormal, they are just characteristic. Turk and Flor (1989) point out that FS patients have also been described as anxious, depressed and normal. Some of the reported characteristics such as those describing FS patients as unstable, anxious and sluggish may be related to a sleep disorder found to be associated with FS (Moldofsky, Scarisbrick, England & Smythe, 1975).

The literature of the early 1980's seems to reflect attempts to establish FS as being primarily a psychological disorder. An abstract of a study by Marks, River, Kimball, and Medof (1983) demonstrates the frustration physicians and patients experience when the etiology and effective treatment of a disorder have been elusive. These researchers interviewed 18 FS patients in order to determine a typical psychological profile. They began by reporting that the prior literature has described FS patients as demanding, perfectionistic and exhausting to the examiner. While the demanding and perfectionistic characteristics are often cited by others, the characteristic of being exhausting to the examiner has not. Because only the abstract has been published, it is difficult to determine whether this is a citation of prior literature or whether this characteristic is based on Mark et al.'s (1983) own clinical experience. The reported findings of this study indicate that the 18 patients were females ranging in age from 27 to 47 years with a mean age of 42.4 years. The mean duration of their illness was 4.8 years, ranging from 1 to 11 years. All of the subjects reported that their symptoms worsened during regular activities. Nine of the 18 (50%) reported a need to keep constantly busy and all continued to perform regular chores despite intense discomfort. Nine of the 18 indicated that their pain interfered with sexual intercourse while all 18 reported that they had never enjoyed sexual relations. Fifty percent of these 18 patients had a hysterectomy while 15 of 18 had some form of gynecological surgery; 12 had a history of obesity, and 7 had a history of somatization. All 18 subjects felt anxious and/or depressed, especially during times when the discomfort of their fibrositis was less intense. The symptoms also reportedly interfered with interpersonal relationships with husbands, boyfriends and mothers. These subjects also demonstrated increased concern about the adequacy of their bodies and their adequacy as women. These authors conclude that the illness serves as a way for these patients to influence relationships and a way of seeking help. The lack of help allows them to blame and reject others, including physicians. It is not clear how they draw these conclusions from their data. While some of their findings, such as a reluctance to use analgesics (also reported by Smythe, 1985) and reports of depression and/or anxiety, have been cited by others, their other findings have not been reported by previous or subsequent authors, particularly the findings that patients report increased anxiety with less intense discomfort, and aversion to sexual relations and gynecological problems. The fact that those symptoms are so prevalent in this particular sample, while they are not mentioned in others studies, leads to the question of how this sample was selected and whether or not the sample was representative of the fibromyalgia population.

Several researchers have used the Minnesota Multiphasic Personality Inventory (MMPI) to investigate the psychological characteristics of fibromyalgia patients. Payne, Leavitt, Garron, Katz, Golden, Glickman and Vanderplate (1982) compared the MMPI profiles of fibromyalgia patients to those of patients with rheumatoid arthritis (RA). The RA group was used to control for pain and disability associated with rheumatic illness. The fibromyalgia group had higher mean scores on 9 of 10 clinical scales. Mean elevations above 70 occurred only on scales 1 and 3. They also found that FS patients differ from one another more than do RA patients. The mean MMPI scale 2 score was not in the pathological range and did not differ between the two groups. They concluded that, because FS patients had higher mean scores in comparison to the RA patients, the elevated scale 1 and 3 scores in the fibromyalgia patients are not simply a reaction to pain.

Wolfe, Cathey, Kleinheksel, Amos, Hoffman, Young and Hawley (1984) used three control groups in their study of the psychological characteristics of fibromyalgia patients. They compared MMPI scores of FS patients to those of a random RA control group, a matched RA control group, and a group of RA patients who had FS in association with their RA (RAFIB). They found that 28% of the FS patients were classified as normal according to their MMPI profiles, 35% were classified as somatically concerned (elevations on scales 1 and 3), and 37% were classified as psychologically disturbed (elevations on scales other than, or in addition to scales 1 and 3). Of the RA only subjects, 50% were classified as psychologically disturbed. The RAFIB group had elevations and profile patterns that were very similar to those of the FS group. They had lower mean scores on scales 4, 6, 7 and 8 and a higher mean score on scale 2. These authors also used several others measures: Family Inventory of Life Events, Multidimensional Health Locus of Control (MHLC), a measure of motivation, and the anxiety and depression scales of the Arthritis Impact Measurement Scales (AIMS). The two groups (fibromyalgia and RAFIB) differed on the AIMS anxiety and depression scales. There was a difference of .2 points on the depression scale scores for the two groups, and a difference of 1.4 points on the anxiety scale scores. The four groups did not differ on the other measurements. They concluded that the those with fibromyalgia were, as a group, more psychologically disturbed than were those who had only RA.

Ahles, Yunus, Riley, Bradley and Masi (1984) viewed the study of Payne et. al. (1982) as having problems because they had used all hospitalized FS patients. They contended that the subjects in the study were not representative of most FS patients because persons with the disorder are rarely hospitalized for the condition. In addition to comparing RA, FS and control groups on MMPI profiles, they also compared their subjects' scores on the Life Events Inventory (Holmes & Rahe, 1967) and the Assertiveness-Aggressiveness Inventory (Bakker, Bakker-Rabdau-Breit, 1978). They found that the fibromyalgia group scored significantly higher than the normal control group on 8 of 10 MMPI scales and higher than the RA group on scales 1, 3, 7 and 8. Only the mean scores on scales 1 and 3 were near 70 or more (69.8 and 69.71 for scales 1 and 3 respectively) for the FS group. There were no mean scores of 70 or more for the two control groups. The FS group scored higher than the RA group on the Life Events Inventory, but there were no significant differences between the two groups on the Assertiveness-Aggressiveness Inventory.

Ahles et al., (1984) also broke the FS and RA groups down into subgroups according to MMPI profile type. They found that 36% of the FS group were in the normal range, 33% had profiles that were typical of chronic pain patients (elevations on scales 1 and 3) and 31% were psychologically disturbed. Ahles, Yunus, Gaulier, Riley and Masi (1986) re-analyzed their data using the contemporary norms developed by Colligan. When the contemporary norms were applied, they found that 48.9% of the FS patients were classified as normal, 33.3% of the profiles were typical of chronic pain patients, and 17.8% were classified as psychologically disturbed. In the original study, 16 of 45 subjects were in the normal group, 15 were in the chronic pain group, and 14 were in the psychologically disturbed group. The re-analysis resulted in 22, 15 and 8 patients in each of the above three groups respectively. There were still significantly more fibromyalgia patients in the psychologically disturbed category in comparison to the RA and normal control groups. However, they point out that the large number of FS patients in the normal group argues against a psychopathological explanation of pain in FS patients.

There has been a tendency toward believing that symptoms in the absence of diagnosable disease (absence of objective measures), are a reflection of psychological disturbance. The MMPI has often been administered to chronic pain patients in order to determine whether their pain is organic or functional in nature (Moore, McFall, Kivlahan & Capestary, 1988). Studies have shown that the MMPI is not an appropriate measurement for distinguishing between organic and psychogenic pain (McCreary, Turner & Dawson, 1977; Stone & Pepitone-Arreola-Rockwell, 1983). There have also been studies suggesting that MMPI elevations on scales 1, 2, 3, and 8 are actually a reflection of disease symptoms and duration and severity of chronic pain. Even in chronic pain of unknown origin, elevated scores on scales 1, 2, and 3 may be the result of the pain since the scores are reversible when the pain is reduced or eliminated (Leavitt & Katz, 1988; McGrath & O'Malley, 1986, Moore, et al., 1988; Ornduff, Breenan & Barrett, 1988; Pincus, Callahan, Bradley, Vaughn & Wolfe, 1986; Rook, Pesch & Keeler, 1981; Smythe, 1984; Sternbach & Timmermans, 1974; Watson, 1982).

Leavitt and Katz (1988) questioned the use of the MMPI with FS and RA patients. Eighteen out of 117 statements on scales 1, 2, and 3 differentiated patients with FS and RA from normals. Patients with FS had higher scores on 15 of 18 statements. In addition, 14 statements on scale 8 differentiated patients with FS and RA. Most are somatic items, however, others included reports on loneliness and unhappiness which could be a reaction to the disorder or could be unrelated. This indicates that more study needs to be done. Their main point was that there is a bias toward elevated scores on scales 1, 2, 3, and 8 in FS patients and, therefore, interpretation should be made cautiously.

Sternbach (1973) was the first to recognize that not all chronic pain patients have elevated profiles. Since then, several studies have replicated the MMPI profile groups (normal, chronic pain, and psychologically disturbed) in chronic pain patients (Bradley, Prokop, Margolis & Gentry, 1978; McCreary, 1985). Some have attempted to look at differences between these profile groups. Naliboff, Cohen and Yellin (1983) found that the groups could be distinguished by the patients' reported limitations in function. Bradley and VanderHeide (1984) suggest the importance of the demographics of the various groups. They found that those having scores within one standard deviation of the mean also showed the most adaptive coping responses. So far, the groups have not been shown to be useful in predicting treatment outcome (Brennan, Barrett & Garretson, 1986; McGill, Lawlis, Selby, Mooney & McCoy, 1982). Several other investigators reported that variables such as pain duration, pain intensity, disability and number of painful sites are positively related to elevated scores on scales 1, 2, and 3 (Armentrout, Moore, Parker, Hewett & Feltz, 1982; McCreary, Truner & Dawson, 1981; Oosterdam & Duivenvoorden, 1987; Snyder & Power, 1981).

Although the MMPI studies have shown that only a subgroup of FS patients have profiles indicating psychological disturbance, references to these studies have often been limited to the general statement that FS patients are psychologically disturbed. The early studies making use of the MMPI did not look at whether or not those who fall within the psychologically disturbed subgroup are also those who are making the poorest adjustment to the disorder. O'Reilly, Burckhardt, Wiens and Bennett (1991) administered the Cornell Medical Index Health Questionnaire and the MMPI to 74 women with FS. Thirty-two percent of the subjects fell within the psychological disturbance subgroup, 15% had normal profiles and 53% were in the pain profile group. Those within the psychological disturbance group were also more likely to have multiple somatic and emotional complaints on the CMI subscales. The question that remains unanswered is whether or not those in the psychological disturbance group also differ from the other groups in terms of psychosocial variables and in their pain and stress management skills. It may be that information about those variables would be more useful in developing psychological treatment programs for those FS patients than merely looking at the level of psychological disturbance alone.

Hell, Balmer, Battegay, Lakhardt and Miller (1982) looked at differences in psychosocial and personality characteristics between 48 FS patients and 25 arthritis patients. A structured psychological interview and the Freiburg Personality Inventory were administered. The results indicated that FS patients experience more stress and problem situations, both prior to the onset of the disorder and currently. FS patients also described themselves as more psychosomatically disturbed and less emotionally stable than did the arthritis control group subjects. FS patients were more often separated from parents in early childhood (25% vs 8%) and were less likely to have experienced a companionable relationship with at least one parent (8% vs 48%).

Other researchers have examined the relationship of affective disorder and somatization disorder to FS. Based on the finding that patients with melancholia have a high rate of nonsuppression when given the dexamethasone suppression test (DST), Hudson, Pliner, Hudson, Goldenberg and Melby (1984) administered the DST to 23 FS patients. They also used the National Institute of Mental Health Diagnostic Interview Schedule (DIS) to determine the presence of current psychiatric diagnoses based on the Diagnostic and Statistical Manual-III (DSM-III) criteria. The Hamilton Rating Scale for Depression was also used to measure current levels of depression. Only one of 23 FS subjects (4%) had a nonsuppression response. This rate was not significantly different from the 9% nonsuppression rate found in normal controls. The 14% rate is significantly lower than the 43.6% nonsuppression rate reported in patients with melancholia. Six subjects met the criteria for major depression but only one met the criteria for melancholia.

Goldenberg (1986) also administered the DIS to 31 FS and 14 RA patients. The DIS not only assesses current diagnosis of mental disorders, it also provides information about past diagnoses. Seventy-one percent of patients with FS, but only 14% of RA patients and control subjects had a history of depression. Current depression was present in only

26% of the FS subjects. The onset of depression preceded the onset of FS in 64% of the patients by a mean of 11 years (range 1-30 years). FS patients scored higher on the depression measure than did RA patients with mean scores of 13.1 and 7.3 respectively. Assessment of an additional 51 FS patients presented similar results. Goldenberg suggests that the results indicate a relationship between FS and major depression, but the fact that only 25% of the patients with FS were depressed at the onset of the disorder indicates that the relationship is not causal.

Gupta and Moldofsky (1986) also examined the possible relationship between FS and dysthymia (previously referred to as melancholia). They examined the rapid-eye-movement (REM) and non-REM sleep patterns in patients with dysthymia. In this study no FS patients currently met the criteria for affective disorder. The FS patients reported more pre- and post-sleep pain and there were more alpha waves in their non-REM sleep, which is consistent with other sleep studies of FS patients. The dysthymic subjects reported deeper sleep, and high amplitude theta bursts were observed during stage 1. These results suggest that FS and dysthymic disorder are separate clinical entities.

In order to assess the similarity of FS to seasonal affective disorder, Moldofsky, Lue, Natarajan and Reynolds (1992) administered the Seasonal Pattern Assessment Questionnaire of Mood to 70 FS, 43 RA and 44 normal control subjects. In addition, subjects rated the seasonality of their pain and reported monthly symptoms. Forty-three percent of FS versus 25% of controls and 16% of RA subjects rated mood impairment equivalent to that found in those with seasonal affective disorder. FS patients reported the greatest pain, worst mood, least energy and most non-restful sleep from November to March. FS patients were, therefore, more affected by seasonal environmental factors.

Clark, Campbell, Forehand, Tindall and Bennett (1985) failed to demonstrate any psychological differences between FS and general medical outpatient subjects as measured by the Symptom Checklist-90-R, Beck Depression Inventory and the State-Trait Anxiety Inventory. The patients were selected by screening 596 general medical patients by administering a 15-item questionnaire, measuring tenderness at specific areas with a dolorimeter, and having patients rate pain over specific areas of their body. Twenty-two of the patients met the criteria for the diagnosis of FS. The control group was taken from other members of the 596 that did not meet the criteria for the diagnosis of FS. Twenty-two control subjects were matched in age, sex, and clinic with the FS group. Goldenberg (1986) suggests that because these patients had not been previously diagnosed with and treated for FS, but instead were diagnosed at the time of the screening procedure, they were likely to have experienced less pain and to have undergone fewer diagnostic tests and therapeutic interventions than FS patients who have sought treatment specifically for their FS symptoms. These patients, therefore, would be expected to score differently on pain profiles than patients referred to rheumatologists. Clark et al. (1985) also acknowledged a possible selection bias in that their control group demonstrated a higher incidence of musculoskeletal pain and fatigue than did the initial 596 subjects. These symptoms would make distinctions between the FS and control group difficult.

Hadler (1986) suggests that the striking finding of the Clark et al. (1985) results is that the so-called fibrositic patients were indistinguishable from non-fibrositic volunteers by a battery of psychological tests. This finding is in sharp contrast to earlier studies. Hadler suggest that the major distinction is that the FS patients in this study had not been clearly diagnosed or "labeled" as having fibrositis at the time they had entered the study although they had sufficient symptoms and exhibited the tender points. Hadler suggests that these results raise the question of whether the patients' perceptions of symptoms as meaningful or even incapacitating is somehow contingent on the labeling. Hadler further suggests that there is a danger in labeling a "non-disease" because it can cause patients to perceive themselves as ill. Rather than risking a negative labeling effect, patients should simply be told that their muscle aches are not representative of a destructive process to the muscle or other tissues. Hadler seems to be drawing the conclusion that the psychological abnormalities found in FS patients are a direct response to labeling. Hadler seems to be ignoring the possibility that the patients in this study may have already perceived themselves as ill given the fact that they were seeking medical help of some type since they were selected from a group of subjects seeking treatment at a medical clinic. Although Clark et al. (1985) did not indicate what problems these patients were initially seeking help for, it seems possible that the symptoms they sought relief from could have been those frequently seen in FS patients. The fact that those diagnosed were not being seen by rheumatologists is not unusual given that most FS patients do not see rheumatologists until they have been seen by several other physicians first. This is partly due to the fact that many physicians from other areas of medicine are not familiar with the disorder. An alternative explanation that Hadler did not consider is that these patients may not yet have been experiencing the symptoms for a very long period of time and may not have yet undergone the numerous diagnostic tests and unsuccessful therapeutic treatments that typify the history of FS patients. It may be that psychological disturbance is a reaction to not having a sense of how to gain control over the symptoms. A label, along with education as to the lack of progressiveness of the disorder could also provide some psychological relief to patients who have perceived their physicians as believing their symptoms are not real or psychological in origin with no physical basis. A label, along with education regarding the patient's responsibility for the management of symptoms, can provide a sense of control that could, theoretically, reduce anxiety and depression and could, therefore, be empowering to the patient.

Hudson, Hudson, Pliner, Goldenberg and Pope (1985) conducted a family history study of psychiatric illness in 31 patients with FS and they found significantly higher rates of major affective disorder and anxiety disorders in FS patients than in RA patients. A 71% rate of major affective disorder was found in the FS group with 26% currently meeting diagnostic criteria for major depression compared with none in the RA group. Of the 22 FS patients with current or past major affective disorder, the onset preceded the onset of FS. They suggest that FS may be a form of major affective disorder in which somatic symptoms are prominent or that a personal or family history of major affective disorder may simply predispose some individuals to the development of FS.

Kirmayer, Robbins and Kapusta (1988) administered those portions of the DIS which are necessary for making diagnoses of major depression and somatization disorder to 20 FS and 23 RA patients. Twelve months after the initial interview the subjects were contacted by researchers to inquire about their feelings of nervousness and depressed mood and their use of health care services over the past year. There were no significant differences in the number of symptoms of depression as measured by the Center for Epidemiologic Studies Depression Scale (CES-D). There was no significant difference between groups on the number of times each had talked with a physician about "nerves" or emotional worries. The FS patients reported significantly more symptoms when responding to the modified somatization scale of the Symptom Checklist-90. FS patients reported significantly more somatic symptoms. Only one FS patient fulfilled the criteria for somatization disorder, however, FS patients reported more medically unexplained symptoms than did RA patients. Seven of the 22 FS patients (33%) versus no RA patients reported that they had been sickly most of their lives. Five FS patients had stayed home from work for two weeks or longer without medical explanation. The results of their study showed differences in illness behavior with FS patients seeing a mean of 3.1 different physicians before visiting a rheumatologist compared to only 1.3 for the RA group. However, these authors did not apparently consider the fact that RA may be detected more quickly through blood tests while there are currently no laboratory tests that can be used to quickly detect FS. The FS patients, as a group, were also more likely to have had surgery for non-musculoskeletal problems. They suggest that their results indicated the possibility that somatization could result from psychosocial worry, and attributing emotional distress to somatic causes, that make symptom reporting and help seeking more prevalent in this population.

Since RA is a well defined disease with reproducible and quantifiable markers of disease activity, disease severity and psychological abnormality, Wolfe, Cathey and Kleinheksel (1984) hypothesized that if FS is only a psychological disorder, then RA patients with FS (RAFIB) might have less severe RA than those with just RA. They found no difference in the severity of RA patients versus those with both FS and RA. Pain scores were higher for RAFIB patients and the pain level was found to vary with changes in tender point count.

Uveges (1987) compared 25 FS patients with 25 members of an arthritis pain control group on psychosocial variables that have been shown to be related to coping with illness. Those variables include psychological disturbance, disability status, appraised threat and ability to decrease pain, stress level, pain coping methods, and pain dimensions. The two groups did not differ significantly on demographic variables such as age, gender, education, marital status, pain duration, disability status or income.

The Symptom Checklist-90-Revised (SCL-90-R) was used to measure psychological disturbance. The two groups differed significantly on five of nine SCL-90 subscales including somatization, depression, anxiety, hostility and psychoticism with FS patients scoring higher on each. They scored similarly on obsessive-compulsive, interpersonal sensitivity, phobia and paranoid ideation subscales. The Arthritis Impact Measurement Scales (AIMS) was used to examine differences in functional disability and emotional disability. The physical functioning subscale score which includes mobility, physical activity, dexterity, independence in activities of daily living and household activities, did not differ significantly between the two groups. The psychological status subscales measuring depression and anxiety indicate that the two groups did not differ on the depression scale, but the FS group scored higher than controls on the anxiety subscale.

Uveges (1987) developed a measure of appraisal with appraisal defined as a two-dimensional cognitive process that involves the evaluation of a particular event as a threat (primary appraisal) and the degree to which coping resources are perceived as being available (secondary appraisal). The results indicated that the FS group reported pain as being a greater threat than did the control group and reported a lower perceived ability to control the pain.

The Hassles Scale (Kanner, Coyne, Schaefer & Lazarus, 1981) was used to assess stress level. Hassles are defined by Lazarus (1984) as experiences and conditions of daily living that are subjectively appraised a being salient and harmful to the individual's well being. This instrument measures the frequency and intensity of minor daily irritations. The two groups did not differ on the number of hassles experienced, but the FS group demonstrated higher scores on stress severity level.

The Ways of Coping Scale-Revised (WOC-R) (Folkman & Lazarus, 1980) was used to assess cognitive and behavioral strategies of coping. The problem-focused items describe problem-solving efforts and behavior strategies for managing a problem while emotion-focused coping items describe cognitive and behavioral strategies for reducing or managing emotional stress. No significant differences were found between the two groups in the number of coping methods used, or on the extent to which they used problem-focused and emotion-focused methods.

The McGill Pain Questionnaire (MPQ) examines three dimensions of pain described by patients. The subject is presented with a list of 78 words describing three dimensions of pain: sensory, affective and evaluative/cognitive. The subject is asked to select words that describe their pain. The 78 words are also divided into twenty subclasses each composed of two to six words. These are ranked according to intensity ratings. The subjects are asked to pick one word from each group that best describes their pain. The two groups in the Uveges (1987) study differed significantly on the number of descriptions used with the FS group selecting a greater number of descriptors. The FS group scored higher on both the sensory and affective dimensions. The MPQ also measures pain intensity (average level, present level, and least and worst levels), percent of time pain is present, and percent of the subject's body involved in pain. The FS group scored higher on present pain level, they indicated that their pain was present more of the time and reported pain in more areas of the body.

Uveges (1987) concluded from his results that FS patients as a group, demonstrate greater psychological disturbance than do other arthritis patients. The difference between the groups could not be explained by differences on demographic variables, physical disability status or differences in coping methods. It is suggested that differences between the two groups on pain level, stress level, and appraisal of pain as a threat could contribute to the greater scores on measures of psychological disturbance.

Uveges (1987) offers four possible interpretations in support of his results: (1) FS patients may be relatively more psychologically disturbed to begin with, which in turn, influences their pain perception; (2) the pain level of the FS group may truly be of a greater magnitude than that of the arthritis pain control group; (3) a cyclical or cumulative combination of the first two interpretations may exist such that pain in FS is severe, which leads to emotional distress, which exacerbates pain, which causes even greater distress; or (4) FS and psychological disturbance may be related through a yet unidentified variable which independently influences both pain and ratings of psychological disturbance.

The major contribution of this study is its focus on adjustment to the illness and psychological disturbance rather than focusing on psychological disturbance as a causal factor in FS.

Uveges (1987) presented the mean scores of both groups, but did not indicate the range of scores for the two groups or percentage of members in the FS group who scored in what would be considered the normal range. One of the suggestions Uveges makes as an area that needs further study is the identification and analysis of subgroups of FS patients. This suggestion indicates the possibility that Uveges may also have found the FS group in his study to be heterogeneous in terms of how they scored on psychological measures.

Others who have compared RA and FS patients have reported similar findings. Robbins, Kirmayer and Kapusta (1990) propose that the somatic distress and disability of FS patients may be due to cognitive factors that amplify body awareness. Exaggerated worry about having a serious illness may also lead FS patients to reduce activities and mislabel new body sensations to confirm this fear. Analyzing the same group used in the Kirmayer, Robbins and Kapusta (1988) study, they found that illness worry was significantly correlated with symptomatology among both the RA and FS groups. Illness worry was strongly correlated with disability and giving up activities among FS patients, but not in RA patients. It would be useful to determine whether those who do the greatest amount of worrying are also those with the least amount of information about the disorder and least confidence in their skills and/or in their ability to manage and cope with the symptoms.

More recently, the studies of FS patients have focused more on factors that contribute to, or hinder, patients' adjustment to FS. Dailey, Bishop, Russell and Fletcher (1990) examined the relationship between psychological stress and social support in FS patients. They hypothesized that when coupled with low levels of social support, psychological stress may increase the patient's susceptibility to pain and increase the likelihood that pain will occupy their attention. They measured environmental stress using three scales: the Life Experience Survey, the Hassles Scale, and the Daily Uplifts Scale. The Inventory of Socially Supportive Behaviors (ISSB) was used to assess the frequency with which a person is the recipient of supportive actions by others. The items of this scale make up three categories: emotional support, informational support, and tangible support. The functional impairment of the subjects was assessed using the Arthritis Impact Measurement Scale; its subscales include: (1) mobility, (2) physical activities, (3) dexterity, (4) household activities, (5) activities of daily living, (6) anxiety, (7) depression, (8) social activity, and (9) pain.

Twenty-eight FS patients were compared to 20 RA patients on the above measures. The impact of illness on the functioning and quality of the patient's life was similar for members of both groups with the exception of anxiety which approached statistical significance with FS patients showing greater anxiety than RA patients. Measures of stress were somewhat inconsistent with FS patients showing significantly higher levels of stress on the Hassles Scale and lower levels of stress on the Life Experience Survey. The differences found on the Hassles Scale related to the symptoms of the disorder itself such as declining physical abilities and concerns about health in general. When the disorder related items were removed from analysis, the FS group continued to show significantly higher levels of stress. The larger number of hassles were strongly associated with greater psychological disturbance. The two groups did not differ significantly on measures of uplifts and social support. Correlations between measures of stress and social support scores on the AIMS showed that the Hassles Scale was significantly related to the AIMS psychological measure (anxiety, depression). These results indicate a relationship may exist between reported levels of anxiety and depression with the amount of stress and social support experienced by FS patients. This indicates that depression and anxiety experienced by a subgroup of FS patients may be a reaction to stress and low social support.

Baumstark (1990) examined factors that may contribute to pain behaviors in FS patients. She reasoned that understanding what factors predict or contribute to pain behaviors may be important in understanding how to help patients cope with pain and reduce maladaptive behaviors. The goal of the study was to determine the relationship of self-ratings of physical ability, pain, and depression to the number of pain behaviors demonstrated by the subject. Pain behaviors were measured by behavioral observation which involved videotaping the 58 female subjects while they were performing a standardized random sequence of sitting, walking, standing, and reclining. Eight behaviors were targeted, they included: guarding, bracing, self-stimulation, grimacing, sighing, passive rubbing, active rubbing, and ridgidity. The Symptom Checklist-90-R was used to assess psychological distress with emphasis on the depression scale. The McGill Pain Questionnaire was used to assess both physical and psychological aspects of pain, and the AIMS was used to measure physical ability. The results were compared to a control group consisting of 20 RA patients. The FS patients and RA subjects did not differ in the mean number of pain behaviors. None of the independent variables was correlated with the total pain behaviors when all 8 behaviors were included in the analysis. However, after controlling for the effects of number of painful body areas and age, the physical ability score from the AIMS was a significant predictor of total pain behavior score when only guarding, bracing, grimacing, and sighing were included in the analysis. Older subjects and subjects with more physical disability demonstrated more pain behaviors. It was also found that patients with higher levels of depression reported higher pain levels and more physical disability. The results emphasized the need to assess patients' self-perception of physical ability since it is physical ability that was most predictive of pain behavior. In particular, Baumstark suggests a need to assess FS patients' feelings of self-efficacy regarding physical functioning.

Birnie, Knippin, van Rushwick, DeBelevorest and deBoogd (1991) suggest that FS shares characteristics with chronic pain patients and, therefore, FS patients would be expected to share similar psychological and other problems with other chronic pain patients. They tested this hypothesis by comparing three pain groups (a nonchronic pain group, a chronic pain group and a fibromyalgia group) on the SCL-90-R, the Illness Behavior Questionnaire, and the chronic pain group and nonchronic pain group were clearly distinguishable using these variables, with the chronic pain group having higher scores on most variables. The chronic pain group had more other complaints that were not directly related to the complaint for which they had originally sought help from the physician, had more painful locations and more somatization. They reported experiencing more sensations of body deterioration, feelings of hostility toward others, and more depression. The nonchronic pain patients were more likely to report improvement or no change in pain than were chronic pain patients. Eight percent of chronic pain patients reported a worsening of their complaints. The FS patients were very similar to the chronic pain patients. There were no significant differences between the FS and chronic pain groups on most variables except that FS patients reported pain in more locations and scored higher on the somatization scale.

Bradley (1989) suggested that it may be useful to evaluate the efficacy of cognitive-behavioral therapy in patients with FS. Since cognitive factors have been shown to be associated with levels of psychological and functional disability in other pain populations, there is reason to believe that FS patients' perceptions and evaluations of their ability to control aspects of their disorder will also have similar consequences for FS patients.

Nielson, Walker and McCain (1992) examined the possibility that cognitive-behavioral treatment (CBT) used in other chronic pain groups may also be efficacious in treating FS patients. They used a treatment approach developed by Turk, Meichenbaum and Genest (1983). The treatment included relaxation training, cognitive restructuring, aerobic and stretching exercise, and family education. The results indicated that FS patients receiving cognitive-behavioral therapy demonstrated changes in the expected direction on all target variables (pain severity, perceived interference with life, sense of control over pain, emotional distress dimensions of the Multiphasic Pain Inventory; the emotionality and worry dimensions of the Pain Experience Scale, Depression on the Center for Epidemiologic Studies Depression Scale; state and trait anxiety measured by the State-Trait Anxiety Scale and in the observed University of Alabama at Birmingham Pain Behavior Scale) but showed no change on variables not specifically addressed by the treatment (perceived support by others, response by significant others to pain, mental adjustment, and activity level in the home). This provides some evidence for the efficacy of CBT in treating FS patients. These authors suggest that the results should be interpreted cautiously given the small number of subjects (n=25).

The current direction of psychological study of FS patients seems to be moving toward examining treatment issues and ways of helping patients.

Physiological Literature

Lack of support for the original hypothesis that FS pain is a result of inflammation of the white fibrous tissue resulted in a reduction in research. A renewed interest in the study of FS occurred following the work of Moldofsky, Scarisbrick, England and Smythe (1975). Influenced by patient complaints of increased morning tenderness and stiffness, they examined the electronencephalogram (EEG) patterns of 10 sleeping FS patients. All ten of the subjects showed a disturbance in non-REM sleep. Following this finding, they took healthy university students and deprived 7 of them of REM sleep and deprived 5 of stage IV, slow-wave sleep. Only the subjects deprived of slow-wave sleep showed a significant increase in tenderness. Some of those patients also complained of anorexia and/or overwhelming physical tiredness, some to the point of experiencing difficulty in walking or standing. They also observed that these symptoms were more difficult to induce in physically fit subjects. They suggested that stage IV sleep deprivation along with poor physical fitness may be responsible for the emergence of musculoskeletal symptoms. It is not clear whether or not physically fit women show this same resistance, given that the study used only one female. It is also not clear that lack of physical fitness is a causal factor. It may be that some reduce their level of activity due to their painful condition. Bennett (1981) found that non-REM sleep increased in fit, but remained unchanged in unfit subjects.

Studies have suggested that alpha wave intrusion of delta sleep may be responsible for the nonrestorative sleep symptoms found in FS patients (Moldofsky & Lue, 1980). Increases in the amount of alpha non-REM sleep has been shown to correlate with increases in pain (McCain & Scudds, 1988). The mechanism of the alpha intrusion is not yet understood. There is some evidence that nocturnal myoclonus and sleep apnea may cause the alpha intrusion in some FS patients (Bennett, 1981). In another study it was found that not all subjects diagnosed with sleep apnea had musculoskeletal pain, indicating that the sleep disturbance alone is not likely to cause FS (Molony, MacPeek, Schifforan, Frank, Neuhuas, Schasberg & Siebold, 1986). Subsequent research indicates that alpha intrusion is not limited to FS, nor is it found in all FS patients (Golden, Weber & Bergen, 1983; Leavitt, Katz, Golden, Glickman & Layfer, 1986; Moldofsky, Lue, Saskin, Salem & Kurtz, 1986). However, some studies have shown a very high percentage of FS patients to have alpha-delta sleep. Simms, Gunderson, Howard and Goldenberg (1988) found the anomaly in 15 of 16 patients. It has been estimated that it occurs in 60-90% of FS patients (Hench, 1989).

Most patients report that the pain is experienced in the muscle. In 1969, new efforts to study muscle pathology were initiated. Kraft, Johnson and LeBan (1969) performed an electromyographic examination of fibrositic nodules and found them to be electrically silent. This fails to support the hypothesis that pain is due to muscle spasm. In the early 1980's researchers began making use of electron and light microscopy in the study of muscle in FS patients. Some of those studies provided some evidence for muscle abnormalities. Scattered split fibers; scattered hyalinized fibers; fibers having a moth-eaten appearance; and extensive symmetrical necrosis of myofibrils with deposition of mitochondria were also found in some studies (Kalyan-Raman, Kalyan-Raman, Yunus and Masi, 1984). These findings are not specific to FS; they are also found in other conditions such as connective tissue disease, polymyalgia rheumatica, polymyositis, and muscular dystrophy (Yunus, Kalyan-Raman & Kalyan-Raman, 1986).

Bengtsson, Hendricksson, and Larsson (1986) found swollen capillary endothelial cells. This finding led them to hypothesize that local hypoxia causes the degenerative changes in the muscles of FS patients. They studied the energy metabolism in muscle specimens taken from tender points within the trapezius muscles. They found evidence for uneven capillary perfusion, a decrease in levels of adenosine triphosphate (ATP), adenosine diphosphate, phosphoryl creatine and an increase in levels of adenosine monophosphate creatine. These findings indicate a change in muscle energy metabolism. Other studies have failed to provide evidence for abnormal energy metabolism (Csuka, Valen, Rilling, Grist & Workman, 1988; Mathur & Gatter, 1988; McCain & Scudds, 1988; Valen, Flory, Powell & Wortman, 1988).

Other abnormal findings include skin discoloration and immunoglobulin deposition at the dermal-epidermal junction, which has also been seen in association with some immune diseases (Caro, 1984). This phenomenon is found more frequently in this population than would be expected by chance alone. Studies have shown it to occur in from 52 to 76% of patients with FS in comparison to about 16% in normal control subjects (Caro, 1984; Caro, Wolfe, Johnston & Smith, 1986). Others have found no immunoreactant deposition at the dermal-epidermal junction (Bloman, Guillot, Leroux & Chertok, 1988).

Another finding that has suggested the possibility of immune dysfunction has been that a subgroup of FS patients (30-33%) show signs of Raynaud's phenomenon and sicca symptoms. These are believed to be associated with autoimmune disease (Dinerman, Goldenberg, & Felson, 1986). FS-like symptoms are also associated with certain acute viral illnesses. Muscle pain in viral illness is considered to be associated with muscle proteolysis secondary to interleukin 1 production (Bennett, 1986). Examination of the sleep physiology of patients with post-infectious neurasthenia demonstrated that the sleep symptoms are similar to those found in FS patients.

Other findings that suggest the possibility of abnormal immune functioning include the following: (1) many patients have acute-onset fibromyalgia symptoms in response to interleukin-2 therapy (Peter & Wallace, 1988; Wallace, Margolin & Waller, 1987); (2) FS patients have exhibited significantly lower Natural Killer (NK) cell activity than is seen in controls (Russell, Vipraio, Tovar, Michalek & Fletcher, 1988); (3) patients infected with Human Immunodeficiency Virus (HIV) have demonstrated a frequency of fibromyalgia that is 6 times that found in the general population (Buskila, Gladman, Langevitz, Urowitz & Smythe, 1990).

The results of the sleep studies led to the examination of serotonin levels in FS patients. Serotonin plays a role in the regulation of non-REM sleep, affective mood and pain sensitivity. It has been found that FS patients have reduced levels of plasma tryptophan which is a precursor to serotonin. The pain sensitivity in FS patients has been found to be inversely related to the level of tryptophan (Moldofsky & Warsh, 1978). Others have found low levels of other amino acids (alanine, histidine, lysine, porline, serine and threonine) as well as serum tryptophan, suggesting the possibility that there may be more generalized deficiency in amino acid metabolism or homeostasis (Russell, Michalek, Vipraio, Fletcher & Wall, 1988). The findings have not been consistent. In a study of 25 FS patients it was found that amino acid levels were not significantly different from those found in healthy control subjects (Yunus, Darley, Masi & Jobe, 1988).

Low serotonin levels may be implicated in some of the other physiological findings. For example, serotonin is believed to trigger the activating signal for human natural killer cells. The monoamine activated by serotonin induces the resting NK cells into active cells, which have the ability to destroy cultured tumor cells in vitro. The low serotonin level could theoretically result in decreased production of NK activation factor and the decreased NK cell activity found in some studies (Russell, 1989). In addition, findings from studies in rats suggest the possible role low serotonin may play in the changes in symptoms with weather changes. Exposure of animals and humans to positive and negative ions has been shown to produce a number of effects including relief from post-operative pain. Exposure to negative ions increases the responsiveness of neurons to serotonin while exposure to positive ions decreases the responsiveness. The studies have also indicated that there are diurnal variations in sensitivity to serotonin in animals, with the least sensitivity in the morning and most sensitivity in the evening. These findings relating to serotonin may contribute to an explanation of the reports by FS patients that their symptoms vary with environmental conditions.

Substance P is a neuropeptide that has been shown by some to be present at higher levels in FS patients than is typically found in normal adults (Vaeroy, Helle, Forre, Kass & Terenius, 1988). Substance P has been suggested as possibly playing a role in the regulation of nociception. Morphine inhibits the release of substance P from dorsal horn cells.

There is some evidence that substance P and serotonin may interact. The two substances coexist in neurons projecting from the periaqueductal gray area of the dorsal horn of the spinal cord (Caro, 1989). Together, they may play a part in pain modulation. Substance P and serotonin release may also be related to the Raynaud's phenomenon and irritable bowel symptoms found in FS patients. Stimulation of the gastrointestinal system such as that associated with a meal or electrical stimulation of the vagus nerve causes an increase in circulating serotonin, substance P, and gastrin, followed by the release of substance P and serotonin into the intestinal lumen. The exact function of those neurotransmitters in the intestine is not yet known, but it is hypothesized that they are involved in bowel motility and homeostasis (Russell, 1989). Evidence also exists for the possibility that substance P is involved in the regulation of peripheral blood flow and may act directly on smooth muscle to induce vasodilation. This has led some to suggest that substance P may be related to the Raynaud's-like phenomenon found in a subgroup of FS patients.

Physiological studies have also demonstrated evidence that the pain experienced by FS patients is nociceptive. Bengtsson, Bengtsson & Jorfeldt (Bengtsson & Hendricksson, 1989) blindly administered saline, an opiod, and local anesthetic to nine patients. No patients given a placebo responded while there was disappearance of pain in all patients given a local anesthetic. The opioid decreased the pain but did not provide total relief from pain. Partial blockage of the sympathetic nervous system resulted in partial relief.

Although physiological studies are demonstrating signs that there are physiological mechanisms involved in the pain and other symptoms associated with FS; including the studies described above and studies implicating abnormal hormonal functioning (Jensen, Jacobsen, Horsley & Petersen, 1988; Russell, Vipraio, Morgan & Bowden, 1986; Tilbe, Bell & McCain, 1988), the exact nature of those mechanisms are not known. The exact nature of the initiating factor(s) is also still unclear.

Self-Efficacy Theory Literature

According to Bandura (1986), perceived self-efficacy refers to beliefs in one's capabilities to mobilize the motivation, cognitive resources and course of action to meet given situational demands. Individuals' perceptions of their self-efficacy affect what they choose to do, how much effort they will exert in a given situation, how long they will persevere in the face of obstacles and setbacks, and the amount of stress that is experienced in coping with environmental demands. Those who underestimate their abilities to handle specific activities approach those activities with a sense of inefficacy and they tend to generate debilitating thought patterns and stress reactions that create internal obstacles to effective functioning in those situations. Those whose beliefs in their coping efficacy are strong, approach situations with more confidence, are able to make better use of the coping skills they have, and are likely to persist in using those skills when faced with obstacles.

Bandura distinguishes between self-efficacy expectations and outcome expectations. Self-efficacy expectations are beliefs regarding one's ability to engage in or execute a specific behavior. Outcome expectations are beliefs about whether a given behavior will lead to an expected outcome (Strecher, DeVellis, Becker and Rosenstock, 1986). This differentiation is made because individuals can believe that a particular course of action will produce certain outcomes, but they may experience doubts about whether or not they can perform the task (Bandura, 1977). While Bandura (1984) suggests that self-efficacy expectations can be judged apart from any reward or outcome that may follow, some suggest that both are influential in behavior change (Borkovec, 1978; Kazdin, 1978; Eastman & Marzillier, 1984; Teasdale, 1978).

Self-efficacy expectations vary along dimensions of magnitude, strength and generality. Magnitude refers to the difficulty level at which a person feels capable of performing. Strength refers to a probablistic judgment or the certainty of one's belief in his/her ability to perform a specific task. Generality concerns the extent to which efficacy expectations about a particular situation will generalize to other situations (Bandura, 1977; 1982).

Bandura (1977) suggests that individuals attain their self-efficacy beliefs through four sources of information: (1) performance or mastery experience, (2) vicarious experiences or modeling, (3) social persuasion, and (4) physiological states. Performance accomplishments, which are direct personal experiences of mastery are considered to be the most powerful source of efficacy information. An achievement will enhance self-efficacy only if it is attributed to one's own ability or skill and not to external or temporary factors. When success is achieved through minimal effort, it is likely to be attributed to one's own ability and will lead to a sense of self-efficacy. If the same amount of success requires a great deal of effort, it is more likely to be attributed to a low level of ability and is less likely to enhance self-efficacy (Bandura, 1984). Vicarious experiences are those in which an individual observes others similar to oneself perform a task. Those experiences raise the individual's beliefs about his/her own capabilities. Bandura (1977) suggests that in order for modeling to affect an individual's self-efficacy in a positive way, the model must be viewed as overcoming difficulties through determined effort rather than with ease and that modeled behaviors that result in clearly rewarding outcomes are more effective than modeling with unclear or unrewarded outcomes. Social persuasion influences self-efficacy through encouraging individuals to exert greater effort in attempting a task which, in turn, increases the chances of success in carrying out that task. Physiological states may be interpreted by the individual as signs of vulnerability and inefficacy. People rely on their state of physiological arousal in judging their anxiety level and vulnerability to stress. These beliefs may be altered through helping the individual change his/her interpretation of their physiological states.

Self-efficacy research has been conducted on a variety of health-related behaviors including relapse in smoking cessation, eating disorders, cardiac rehabilitation, adherence to medical regimens, exercise and pain (O'Leary, 1985). The research may also have some relevance to the major findings of FS research. Those findings include: (1) stress exacerbates FS symptoms; (2) FS patients do not comprise a homogeneous group in terms of psychological variables (a subgroup of FS patients experience anxiety and/or depression); (3) FS patients experience severe pain and fatigue for which there is no known cause or cure and no medication that provides complete relief from those symptoms. The FS patient is, therefore, primarily responsible for her/his own treatment, which includes pain management, stress management, and sleep management. Exercise may be important in all three of these areas of management. At this point, the focus for FS patients is on coping with and managing symptoms rather than on their elimination.

Stress can be defined as demands placed on an organism that exceed its ability to adapt effectively to them (Litt, 1988). In other words, stress arises from a condition in which perceived task demands strain or exceed coping capabilities (Bandura, 1986). Coping refers to specific behaviors or cognitive actions that are used in order to respond to a problem (Tunks & Bellissimo, 1988).

There is evidence that exercise of control over stressors is a critical factor influencing neurophysiological functions that govern health and illness. Exposure to stressors in the absence of controlling efficacy activates stress related hormones and impairs components of the immune system (Bandura, Cioffi, Taylor & Brouillard, 1988). Bandura, Taylor, Williams, Mefford and Bachas (1985) presented phobics with coping tasks that they had previously judged to be in their low, medium or high self-efficacy range, during which continuous blood samples were obtained through a catheter. Epinephrine, norepinephrine and dopamine levels were low when phobics coped with tasks in the high self-efficacy range, whereas coping with tasks in the moderate perceived self-efficacy range resulted in a substantial rise in plasma catecholamines. Both norepinephrine and epinephrine dropped sharply when phobics declined tasks for which they felt inefficacious. After guided mastery was used to strengthen coping efficacy to the maximal level, performance of previously low efficacy tasks no longer elicited differential catecholamine reactivity. Others have suggested that exposure to stressors with controlling efficacy has no adverse physiological effects, but exposure to the same stressors without controlling efficacy impairs various cellular components of the immune system (Maier, Laudenslager & Ryan, 1985).

According to Bandura, O'Leary, Taylor, Gauthier and Gossard (1987) self-efficacy may mediate the aversiveness of an event in several ways. Persons with high self-efficacy may persist longer and devote more effort to cognitive control strategies. High self-efficacy should also reduce anxiety and, therefore, reduce experienced distress and perceptions of pain. Self-efficacy expectations may directly influence levels of catecholamines and endogenous opiates that affect perceived distress and pain. Lan and Gill (1984) examined the influence of self-efficacy on physiological arousal and self-reported anxiety among 32 undergraduate females who performed both an easy (high efficacious) and a difficult (low efficacious) task. When these subjects were performing the high efficacious task, they reported significantly lower levels of worry and somatic anxiety and higher self-confidence than when performing the low-efficacious task. This supports Bandura's prediction that higher self-efficacy tends to lower self-reported anxiety and lower stress responses. These researchers also tested the possiblity that providing a cognitive manipulation in the form of telling subjects that their arousal during the low-efficacy task was a typical and useful physiological arousal pattern of good competitors would result in increased self-efficacy for the task. This hypothesis was not supported.

Bandura, Cioffi, Taylor and Brouillard (1988) tested whether perceived inefficacy in exercising control over cognitive stressors activates the endogenous opioid system. Subjects were asked to perform mathematical operations under conditions in which they could exercise full control over the cognitive task demands or in which the cognitive demands strained or exceeded their cognitive capabilities. They measured changes in the subjects' perceived mathematical self-efficacy, level of autonomic arousal during the cognitive stressor task and their subjective distress, mental stress and perceived mathematics self-efficacy. They administered either an inert saline solution or naloxone (an opiate antagonist) to subjects at each level of self-efficacy. They then periodically measured the subjects' level of pain tolerance. They hypothesized that perceived controlling inefficacy would be accompanied by high stress reactions along with activation of endogenous opioids which would allow low self-efficacious subjects to withstand increased amounts of pain stimulation because of their analgesic effects. They further hypothesized that these subjects' ability to tolerate pain would be blocked by naloxone. They found that the self-efficacious, nonstressed subjects showed no evidence of opioid activation while self-efficacious, stressed subjects were able to withstand increasing amounts of pain under saline solution conditions but, when naloxone was administered, these subjects were unable to tolerate much pain stimulation. This indicated that opioid activation occurred for this group.

Self-efficacy is also suggested to affect people's emotional reactions such as anxiety, level of distress, and thought patterns. Individuals with low self-efficacy about a particular task may ruminate about their deficiencies rather than thinking about accomplishing or attending to the task at hand which, in turn, blocks successful performance of the task (Stecher, DeVellis, Becker & Rosenstock, 1986). Bandura (1977) suggests that anxiety results when people view themselves as incapable of dealing with potentially injurious events. The anxiety, in turn, inhibits expectations of efficacy through the accompanied physiological arousal. Anxiety can result from perceived inefficacy in the face of the potentially injurious events while depression occurs when people feel inefficacious at attaining a highly valued outcome. Bandura also points out that anxiety and depression occur together and suggests this happens when people are confronted with situations where obtaining a valued outcome would obstruct future aversive events. For example, an individual may believe that a particular technique or behavior will reduce or prevent pain (desired outcome that obstructs an aversive event), but they may not believe they have the ability to perform that behavior (low self-efficacy). This is likely to result in the individual becoming anxious due to the inability to perform the behavior and depressed due to feeling unable to bring about the desired outcome.

In addition to having an effect on stress and physiological arousal, perceived self-efficacy also affects which behaviors are carried out in specific situations and the persistence with which those behaviors are carried out in the face of obstacles. Behaviors that are most relevant to patients with FS are those associated with pain management, exercise, sleep management and stress management.

Early studies related to pain tolerance and self-efficacy involved acute, experimentally induced pain. Neufeld and Thomas (1977) manipulated subjects' beliefs about their ability to use relaxation as a coping procedure. They found that actual muscular relaxation was unrelated to pain tolerance, but those who were led to believe that they had a relaxation technique for coping with pain increased their tolerance for cold pressor pain. It was concluded by Reese (1983) that these results indicate that whether a particular method increases pain tolerance depends, in part, on the level of self-efficacy it induces in the people using it. Neufeld and Thomas (1977) had not actually measured self-efficacy, so Reese followed up their study by conducting a study of her own in which she measured self-efficacy. She found support for the hypothesis that success in coping with pain is mediated by increases in perceived self-efficacy. Sixty-four subjects were randomly assigned to four conditions. The group relying on the cognitive modulation of pain control received tape-recorded instructions and practice on a variety of cognitive skills (attention diversion, pleasant imagery, dissociation, self-verbalization) that could be used in coping with pain. The group relying on the motor modality received tape-recorded instructions and practice in progressive relaxation as a method for coping with pain, a third group was administered a placebo capsule and were told that the pill was a widely used medication which is useful for its pain reducing effects. Subjects in the control condition were provided the same general orienting information provided each of the other three groups. Eight of the members of the control group rated their subjective pain but were not asked to rate their perceived self-efficacy so that it could be determined whether a recent judgment of self-efficacy in itself could affect reactions to pain. Pain tolerance (total number of seconds subjects kept their hands in the cold water) and pain threshold (number of seconds from the beginning of the trial until the subject reported discomfort) were measured before and after treatment (exposure to instruction tapes). Perceived level of self-efficacy in tolerating and reducing pain increased in all three treatment groups, but subjects in the control group did not alter their level of perceived self-efficacy. The findings of this study demonstrated that psychological treatments relying on cognitive coping strategies and self-relaxation can be effective for self-management of pain, with cognitive coping producing the better results. The hypothesis that success in coping with pain is mediated by increase in perceived self-efficacy was supported. All treatments raised both the level and strength of perceived self-efficacy to tolerate and reduce pain. Those subjects with higher perceived self-efficacy for tolerating or reducing pain showed higher thresholds for pain and were able to endure the cold pressor longer.

Litt (1988) conducted two experiments using the cold pressor task. These experiments were designed to determine whether self-efficacy has validity as a causal determinant or correlate of behavior change and how perceptions of control and self-efficacy interact to determine choice behavior, persistence, and the impact of an aversive stimulus. In the first study, Litt tested the predictive validity of self-efficacy conditions (high-high, high-low, low-high and low-low, or control). Subjects completed a baseline cold pressor trial following which they were provided with feedback indicating that their performance was either very good (high-high and high-low conditions) or poor (low-high and low-low). Following the second of the three trials they were again informed that their performance was either very good or not very good. Prior to each cold pressor trial, subjects rated their self-efficacy for their ability to tolerate the cold pressor. Performance on the second and third trials were examined to determine whether tolerance times would increase or decrease with self-efficacy manipulations. It was expected that if self-efficacy expectations are causal of behavior, then a significant interaction between condition and trial and changes in self-efficacy ratings would correlate with changes in tolerance times and that negative self-efficacy information would lead to reduction in cold pressor tolerance. The results indicated that changes in self-efficacy expectations predicted changes in cold pressor tolerance.

Litt's (1988) second experiment examined the effects of perceptions of self-efficacy and control and explored how perceptions of control and self-efficacy interact to determine choice of behavior, persistence, and impact of an aversive stimulus. It was designed to test Bandura's (1982) suggestion that self-efficacy expectations may be a mediating variable in determining the desirability of having personal control. Self-efficacy for raising hand temperature was manipulated by using a false hand-warming biofeedback procedure in which subjects were led to believe that they either had excellent or poor hand-warming ability. The subjects' perceptions of instrumental control were altered by leading subjects to believe that temperature of the cold pressor trial would depend on either hand-warming ability (high perceived control) or on using an unknown time limit set by the experimenter (low perceived control). It was hypothesized that individuals who have high self-efficacy regarding their ability to use instrumental control (hand-warming) would have longer pain tolerance than those whose self-efficacy is low. It was also expected that those with high self-efficacy would experience less distress and that those with low self-efficacy would be less likely to choose control and would experience greater distress and anxiety if forced to assume control that he/she feels unprepared to use. The results indicated that performance on the cold pressor was best when both high levels of perceived control and self-efficacy were present. Litt suggests that his results provide support for the hypothesis that self-efficacy expectations mediate the desirability of providing control and those who benefit the most from having control were those with the greatest confidence in their ability to use it.

Others have examined the relationship between self-efficacy and chronic pain. Dolce, Crocker and Doleys (1986) examined the use of self-efficacy expectations on predictions of treatment outcome among 63 chronic pain patients who had participated in a multidisciplinary pain management program. The results indicated that there were reductions in the Beck Depression Inventory; Scales 1, 2, 3, 7, and 8 of the MMPI; pain ratings; and concern for exercise, and increases in medication-free coping and work. There were significant increases in ratings of self-efficacy for exercise, medication-free coping and work. It was found that post-treatment self-efficacy and concern ratings were consistently correlated with follow-up measures of exercise, work status, and medication use. However, these variables did not account for a significant amount of variance at follow-up when regression was used.

Council, Ahern, Follick and Kline (1988) investigated whether or not self-efficacy expectancies (ratings of ability to perform movements) and response expectancies (the degree of pain expected to accompany the movements) are correlated with functional impairment (movement limitations). It was expected that perceived self-efficacy would be directly related to actual performance while response expectancies were hypothesized to demonstrate an inverse relationship to performance. The results indicated that both self-efficacy and pain response expectancies were correlated with actual performance of movements. They were both related to global measures of pain and physical impairment. The results of causal modeling indicated that performance was best predicted by self-efficacy ratings. The self-efficacy ratings appeared to be determined by pain response expectations.

Buescher, Johnston, Parker, Smarr, Buckelew, Andersen and Walker (1991) examined the impact of self-efficacy on pain behavior. They hypothesized that RA patients with high self-efficacy for physical function, pain management, and for controlling other arthritis symptoms would exhibit fewer pain behaviors. The self-efficacy subscales were found to be significantly negatively related to total pain behavior scores, painful joint counts, and depression.

Recent studies have shown some evidence for a relationship between one's beliefs about their ability to control pain and one's ability to cope with or tolerate pain (Spinhoven & Linssen, 1991). In an investigation of the factor structure of the Coping Strategy Questionnaire using members of five chronic pain populations, two factors stood out as being particularly robust. Those factors were conscious use of cognitive coping strategies and self-efficacy beliefs concerning pain (Lawson, Reesor, Keefe & Turner, 1990). Jensen, Turner and Romano (1991) studied 114 chronic pain patients. Their subjects were asked to complete measures of health related dysfunction, pain severity, use of 8 coping strategies, and outcome and self-efficacy expectancies regarding those coping strategies. The results indicated that the patients' beliefs regarding their ability to use those coping strategies was strongly related to their actual coping efforts. Beliefs about the outcome of using those strategies were unrelated to coping. Findings regarding beliefs about outcome may be related to the unique way in which outcome expectancies were measured. Rather than asking subjects to respond with their level of agreement as to whether or not they expect that a specific behavior will lead to a specific outcome, subjects in this study were asked to specify what they expected the outcome would be if they were to perform specific pain relieving strategies.

In a study of rheumatoid arthritis patients by Schiaffino, Revenson and Gibofsky (1991), it was found that self-efficacy beliefs regarding their problem solving coping was associated with greater use of actual problem solving coping. Regan, Lorig and Thoreson (1988) also found that primary appraisal (perception of harm or loss) and coping were related to self-efficacy.

Kores, Murphy, Rosenthal and Elias (1990) had subjects in their study complete a self-efficacy scale measuring beliefs about walking distance, lifting ability, pain coping, work ability and social and recreational involvement. They found that self-efficacy expectancies were associated with the subjects' functioning and their response to treatment. Those with higher self-efficacy scores rated themselves as more improved and they demonstrated higher levels of functioning at follow-up. O'Leary, Shoor, Lorig and Holman (1988) found that it is possible to enhance perceived self-efficacy in rheumatoid arthritis patients through treatment designed to teach skills in managing stress, pain and other symptoms of the disease.

The literature also includes some studies on the relationship of self-efficacy to exercise behavior (Armstrong, 1993; Desharnais, Bouillon & Godin, 1986; Gamble, 1990; Garcia, King & Abby, 1991; Lyons, 1986; Marcus, 1994; McAuley, 1993; McAuley & Jacobsen, 1991; McAuley, Lox, & Duncan (1993) McAuley, Wraith & Duncan, 1991; Nolan, 1986; Poag-DuCharme, 1993; Vidmar, 1991; Yordy & Lent, 1993). This part of the literature review focuses on studies related to self-efficacy for exercise and participation in and/or adherence to exercise programs. Kaplan, Atkins and Reinsch (1984) examined specific versus generalized expectancies as mediators of changes in exercise behavior among 60 chronic obstructive pulmonary disease patients. Subjects were randomly assigned to one of four groups: a behavior modification group, cognitive modification group, cognitive-behavior modification group, and attention control group. The treatment groups demonstrated greater gains in judgments of walking efficacy than the attention control group. Efficacy judgments for walking improved more for those subjects who participated in a program with a behavioral component than did those who were in a program without a behavioral component. In order to test whether increases in efficacy for walking generalized to increases in efficacy in other areas, they assessed the subjects' efficacy judgments for general exertion, pushing or moving things, climbing stairs, tolerance of emotional tension and stress, and tolerance for anger arousal. They expected the greatest change in walking because it was the target for training. Changes in walking efficacy were expected to generalize to climbing stairs and general exertion since they are somewhat related to walking, while tolerance for emotional stress and anger arousal were expected to change very little. The results indicated that change in efficacy expectations for behaviors other than walking changed as a function of their similarity to walking. Health locus of control measurements indicated that the relationship between efficacy judgments and behavior may be stronger for those with an internal locus of control than for those with external locus of control.

Desharnais, Bouillon and Godin (1986) tested the contribution of outcome expectations and self-efficacy for exercise in predicting adherence to exercise in a physical fitness program. Expectations of self-efficacy were found to be the best determinant of exercise program adherence versus dropout. They suggest that their results support Bandura's theory by showing that expectations of self-efficacy is a more central determinant of adherence than expectations of outcome.

McAuley, Wraith and Duncan (1991) tested Bandura's (1986) hypothesis that differing levels of self-efficacy should have different effects on the intrinsic motivation for aerobic exercise. They examined the degree to which perceptions of success and perceived efficacy are related to intrinsic motivation for aerobic exercise. They found that perceived success with respect to improved conditioning was the major predictor of overall intrinsic motivation. Perceived success accounted for 28% of the variance with self-efficacy adding an additional 4%. Highly efficacious subjects were significantly more intrinsically motivated than low efficacious subjects. These results seem to indicate that in enhancing a person's efficacy regarding his/her ability to perform aerobic exercise, it would be important to provide him/her with success experiences.

Yordy and Lent (1993) explored the relative value of three theories (reasoned action, planned behavior, and social cognitive theory) for their usefulness in predicting exercise adherence. The theory of reasoned action posits that intentions to perform a particular behavior serve as an important immediate determinant of actions. Intentions are measured by having subjects indicate their subjective likelihood of engaging in a given behavior.

According to this theory, intentions are the result of the individual's attitude toward the behavior and their subjective norms (perceptions of social pressure to perform the behavior) regarding the behavior. The theory of planned behavior is similar to reasoned action theory but it adds an additional component, perceived behavioral control. This component was added to help explain behavior under which volitional control may be difficult. In the case of exercise, volitional control may be a problem because of possible barriers such as lack of availability of equipment, bad weather, and lack of time. The results indicated that, although all three models were significantly predictive of exercise intentions, reasoned action accounted for the most unique variance. Intention which is a component of planned behavior theory, was a predictor of future exercise behavior. More specifically, it was the subjects' attitude toward exercise that was the greatest significant predictor of exercise. Subjective norm and perceived behavioral control (a component of planned behavior) did not add to the prediction. Self-Efficacy and outcome expectations and their interaction, also provided unique explanation of the variance in exercise. This study also demonstrated that prior exercise behavior was a strong predictor of both exercise intentions and future behavior. Their findings also suggest that intentions may mediate the effects of attitude and self-efficacy on future exercise behavior. Yordy and Lent suggest that cognitive factors such as intention or self-efficacy may become less important as exercise behaviors become more routinized. They suggest that frequent exercisers may not need to engage in as much planful thought as their behavior becomes more regular.

Other studies have found a positive relationship between exercise self-efficacy and actual participation in exercise. Marcus (1994) found that sedentary (precontemplative) women scored significantly lower on exercise self-efficacy than did those women who were maintaining regular exercise. This is consistent with previous findings in which Marcus and Owen (1992) found that self-efficacy differentiated employees who were inactive from those who were highly active. McAuley, Lox, and Duncan (1993) found that exercise self-efficacy predicted adherence to exercise in a group of older adults ranging in age from 45 to 65 years and middle-aged sedentary adults. However, in a different study, Duncan (1993) did not find exercise self-efficacy to be a significant predictor of exercise adherence. Armstrong (1993) found that of 2053 subjects, those who reported no vigorous exercise at baseline, but had begun to think about exercising (contemplators), had higher self-efficacy for exercise than did those who had not thought about exercising (precontemplators). Subjects' baseline stage was predictive of later adoption of vigorous exercise.

Garcia, King and Abby (1991) randomly assigned 74 sedentary adults (ages 50-64 years) to three exercise regimens or to an assessment-only control group. Subjects recorded their participation in exercise and rated their exercise in terms of perceived exertion, enjoyment and convenience. Self-efficacy was predictive of adherence to exercise at 6 month and 1 year follow-up while self-motivation was not. Gamble (1990) examined self-motivation, mood state, self-efficacy for attendance and expectations of benefits as possible predictors of adherence to an aerobic fitness program by 95 healthy adults. They found that expectations of positive outcome and self-efficacy for adherence were predictive of program attendance, while self-motivation was not a significant predictor.

Nolan (1986) found that self-efficacy predicted adherence to a 12 week cardiovascular endurance training program by 123 healthy adults. Self-motivation and outcome expectations did not discriminate between those who adhered to the program and those who did not. Vidmar (1991) examined exercise compliance in a group of 138 cardiac patients who had completed a cardiac rehabilitation program. Both self-efficacy for exercise activity and self-efficacy for exercise when faced with perceived barriers to exercise were both predictive of compliance, with exercise after completing the cardiac rehabilitation program, with perceived barriers to exercise being the stronger predictor of exercise behavior.

Hofstetter, Hovell and Sallis (1990) explored whether the amount and nature of physical activity reported to have occurred during earlier periods of subjects' lives were associated with variables defined by social learning theory. They hypothesized that extensive early experience with exercise and sports may mold exercise self-efficacy which directly or indirectly affects later exercise. Perceived barriers to exercise, self-rated coordination, and social variables related to current modeling, and support from family and friends were the most powerful predictors of self-efficacy. Cognitive variables (perceived benefits, knowledge, health attitudes and coordination), environmental variables (home equipment, neighborhood environment, convenience, media exposure and barriers) and health factors (smoking behavior, activity at work, healthy food habits) were the next most important correlates of self-efficacy. Historical variables (modeling history, exercise injury as a child, exercise injury as an adult, encouragement as a child and forced exercise as a child) and personal characteristics (education, age, sex, and body mass index) were the weakest predictors of self-efficacy, however, having been forced to exercise as a child and body mass index were statistically significant negative correlates of self-efficacy. Their results also suggest that more recent social learning variables may be more important in the development and maintenance of exercise self-efficacy and subsequent physical activity.

In the first part of their study, Dolce, Crocker, Molittier and Doleys (1986) assessed the effects of setting exercise quotas on exercise behavior, worry/concern about engaging in exercise and self-efficacy expectancies pertaining to two exercises (front lateral bar exercises and bilateral knees extension). The single subject in this part of the study was given three exercise sessions without setting quotas in order to establish a baseline measure of ability. The subject exercised until weakness and fatigue or pain made her stop. After the third session, exercise quotas were imposed, self-efficacy expectations increased while worry/concern decreased for each exercise. Their second study was an attempt to validate the results of their first experiment with a group of 14 chronic pain patients. Again, they found that exercise tolerance and self-efficacy increased across the treatment while there was a significant decrease in worry/concern for both exercises. They suggest that the results indicate that a quota system is a desensitization process rather than just a reinforcement process. Fear of injury and anticipated pain are reduced through repeatedly exposing patients to exercise tasks that are small enough to be mastered. They point out that a group of patients did not show an increase in self-efficacy expectations even though they made physical improvements comparable to others in the study. It is suggested that this may be consistent with Bandura's argument that mastery experiences will have little impact on self-efficacy expectations and behavior if physical improvement is attributed to external factors.

The above studies related to self-efficacy regarding one's ability to tolerate pain and to exercise suggest that the theory has some implications for the adjustment of FS patients to their disorder. In addition, stress has consistently been shown to exacerbate FS symptoms. Psychological stress has been defined by some as demands placed on an organism that exceed its ability to adapt effectively to them (Bandura, Cioffi, Taylor & Brouillard, 1988). Given this definition of stress, and Bandura's (1986) suggestion that those who underestimate their abilities to handle specific activities approach those tasks with a sense of inefficacy and generate debilitating thought patterns and stress reactions that create internal obstacles to effective functioning; one would expect that those FS patients who have low self-efficacy regarding their ability to perform those behaviors that are associated with the management of FS symptoms would experience the greatest amount of stress.

The literature also indicates that those with low self-efficacy regarding their ability to successfully implement pain and stress management behaviors will also experience greater anxiety, and to the extent to which they are unable to gain desired outcomes, they may also experience depression. It seems possible that ratings of self-efficacy regarding behaviors associated with the management of FS symptoms may be useful in explaining some of the variance between the three MMPI profile groups that have commonly been found in FS and other chronic pain patient populations. In particular, it may be useful in predicting whether an individual will fall within the "normal" versus the "chronic pain" profile group.

Self-efficacy theory also predicts that those who show the greatest self-efficacy regarding their ability to perform management behaviors associated with FS symptoms will be more likely to attempt those behaviors and to persist in those behaviors in the face of obstacles. In addition, those who receive encouragement from others and have observed similar others manage their symptoms are also more likely to make attempts to perform those behaviors.

Uveges (1987) has suggested that psychological disturbance and FS may be related through some yet unidentified or unassessed variable that influences both pain and psychological disturbance. Given the possible relationship found between self-efficacy ratings and release of cateholamines which are thought to influence pain, it seems possible that self-efficacy could be that variable.

Purpose of This Study

The purpose of this study is to investigate whether self-efficacy theory could be a useful construct for gaining some understanding of fibromyalgia patients' ability to adjust to having the disorder. In particular, this study will examine the concurrent, divergent and convergent validity of an instrument developed to measure self-efficacy beliefs regarding one's ability to exercise and to perform pain, stress and sleep management techniques; along with the subjects' beliefs regarding whether performing those techniques will result in a decrease in fibromyalgia symptoms (outcome expectations).

Self-efficacy theory suggests that those FS patients who believe they have the skills to perform specific pain management and stress management techniques (including exercise) and believe that performing those techniques will result in a reduction of their fibromyalgia symptoms, will persist in their effort in using those techniques. Self-efficacy theory, therefore, would suggest the following hypotheses:

(1) Those subjects who demonstrate a high level of self-efficacy regarding their ability to successfully perform stress management and pain management skills will show a higher level of coping and a greater tendency to use an active approach to coping with their fibromyalgia pain, while those with low levels of self-efficacy will use a more passive approach to coping with pain.

(2) Those subjects who demonstrate a high level of self-efficacy regarding their ability to successfully perform stress management and pain management skills will show a higher level of psychosocial adjustment in terms of their ability to work, fewer days taken off from work or daily activities and fewer appointments needed with physicians.

(3) Those subjects who express a high level of self-efficacy regarding their ability to successfully perform skills necessary for the management of FS symptoms would be expected to demonstrate lower levels of anxiety than those who report a low level of self-efficacy for those skills.

(4) Given Bandura's suggestion that depression is a result of having low expectations regarding the performance of specific skills to bring about a desired outcome, it is expected that those subjects showing low outcome expectations regarding the ability of pain and stress management skills to reduce their fibromyalgia symptoms will show greater depression than those subjects who believe that implementing those skills will bring about a reduction in their symptoms (high outcome expectations).

(5) Scores on the Fibromyalgia Self-Efficacy Measurement will show a high correlation with scores on a scale designed to measure a more general form of self-efficacy regarding ability to control pain and fatigue associated with arthritis and only moderate to low correlation with a measure of health locus of control, general self-esteem and conscientiousness.

If those hypotheses are supported, a measure of self-efficacy could be a useful screening device for identifying those fibromyalgia patients who are likely to show lower levels of active coping and functioning and higher levels of anxiety and depression. In addition to identifying which patients could use extra assistance, measures of self-efficacy regarding management and coping skills could identify specific skills the patient feels he/she is lacking.

CHAPTER 3

METHOD

The present study is designed to develop a measure of self-efficacy related to one's ability to perform specific pain, stress and sleep managment techniques and then to examine the content, divergent, convergent and concurrent validity and the internal consistency and split-half reliability of that instrument. The product of this study, Fibromyalgia Self-Efficacy Measurement (FSEM), provides two scores. The Self-Efficacy Expectation score is an indication of the level of confidence subjects have in their ability to perform specific tasks or skills that are useful in helping persons manage pain, stress and sleep. The Outcome Expectation score measures the level of confidence subjects have that performing those specific tasks or skills will result in a reduction in pain and/or fatigue. A copy of the FSEM can be found in Appendix A.

Subjects

The subjects of this study were recruited from seven rheumatology clinics and two fibromyalgia support groups in central and western Michigan. A total of 106 packets of materials were distributed to potential subjects. All subjects were required to have been given a diagnosis of fibromyalgia by a rheumatologist. Seventy-six of the 106 potential subjects returned their packets. Of those, four were incomplete and eliminated from the study, leaving 72 subjects. The response rate was 67.9%.

The subjects included 69 (96%) females and 3 (4%) males ranging in age from 18 to 71 years (see Table 1). Fifty (69%) of the 72 subjects were married, 13 (18%) were divorced, 5 (7%) were single, 2 (3%) were widowed and 2 (3%) were living with a partner. The majority of the subjects (43 or 60%) reported that they are not currently responsible for any children. Six (8%) reported having one child, 16 (22%) had 2 children, 4 (6%) had 3 children, 2 (3%) had 4 children and 1 (1.4%) subject had 5 children. Ninety-seven percent (70) of the subjects reported being Caucasian. The other two subjects included one Native American and one Asian American. Five (6.9%) had

Table 1

Demographic Information

	n	Percentage
Gender		
Female	69	96.00%
Male	3	4.00%
Marital Status		
Married	51	70.80%
Divorced	13	18.10%
Single	5	6.90%
Widowed	1	1.40%
Living with partner	2	2.80%
Age		
18-25	3	4.17%
26-35	10	13.89%
36-45	26	36.11%
46-55	24	33.33%
56-65	5	6.94%
> 65	4	5.56%
Ethnic Background		
Caucasian	70	97.22%
Native American	1	1.39%
Asian American	1	1.39%
Number of Children		
0	43	60.00%
1	6	8.00%
2	16	22.00%
3	4	6.00%
4	2	3.00%
5	1	1.00%
Education		
Less than High School	4	5.55%
High School	14	19.44%
Some College or Vocational Training	39	54.17%
Bachelor's Degree	12	16.67%
Some Graduate School	3	4.17%

Table 1 (Cont'd)

	n	Percentage
Employment		
Employed	38	52.78%
Unemployed	34	47.22%
Hours worked per week		
0	34	47.22%
1-10	6	8.33%
11-20	9	12.50%
21-30	4	5.55%
31-40	12	16.67%
41-50	4	5.55%
>50	3	4.17%

less than a high school education, 14 (19.4%) had a high school education, 38 (52.8%) had some college, 12 (16.7%) had bachelor's degrees, and 3 (4.2%) had some graduate school training. Thirty-eight (53%) were currently employed, while the remaining 34 (47%) reported that they were not employed. Those who were employed averaged 33.8 hours of work per week.. Forty-two (58%) of the subjects reported that they either had to change jobs, reduce their hours, or stop working due to their fibromyalgia symptoms.

Procedure

The content validity, which becomes a part of construct validity when raters are asked to judge whether the measurement items reflect the theoretical definition of the construct (Ghiselli, Campbell & Zedisk, 1981), was determined using a two-step procedure. In the first step, a group of 16 raters composed of psychologists, social workers, and graduate students in those areas of study were provided a copy of the potential items of the Fibromyalgia Self-Efficacy Measurement along with the instructions that would be provided to those completing the measurement. All raters had prior knowledge of self-efficacy theory. The potential items dealt with stress, pain and sleep managment techniques frequently used in cognitive-behavioral pain and stress management programs.

Given a definition of self-efficacy and outcome expectations the raters were asked to indicate whether or not they believed each item measured self-efficacy expectations (part 1) or outcome expectations (part 2) by circling "yes" or "no". Respondents were also asked to indicate, if possible, why they responded with "no". Based on suggestions from the first group of raters, adjustments were made in the wording of some of the original items and a group of 14 separate raters were asked to respond to revised items, using the same procedure described above, but without providing feedback as to why they responded with "yes" or "no".

The internal consistency of each section of the FSEM was tested by using SPSS Professional Statistics program. For each item the statistical program used provides information about what the Cronbach alpha would be if that item was removed. An item was removed from the measurement if the Cronbach alpha level would improve significantly as a result of its removal. For each item, the statistical program provides the Cronbach alpha that would result if that item were removed. If the Cronbach alpha would increase significantly if an item were removed, the item was removed before further analyses were performed.

Following the removal of items in the above procedure, the split-half reliability of each section (self-efficacy and outcome expectations) was computed. The split-half reliability was measured rather than the test-retest reliability because self-efficacy can change over time. In order to perform a check on the test-retest reliability, it would have been necessary to have people refrain from getting any cognitive-behavioral treatment or increasing their exercises during the test-retest interval. Exposure to opportunities to learn some of the techniques on which items are based could result in changes in self-efficacy. It was not possible to control for treatment in this study.

After it was determined that the internal consistency and split-half reliabilities were at acceptable levels (.89 and .88 for internal consistency of self-efficacy expectations and outcome expectations respectively and .93 and .90 for split-half reliability for SE and OE sections respectively), the divergent validity was determined by correlating the scores on the FSEM with scores on the Multidimensional Health Locus of Control, the Rosenberg Self-Esteem Scale and the Conscientiousness scale of the NEO-PI. The convergent validity was tested by correlating FSEM scores with scores on the Arthritis Self-Efficacy Scale. These scales used for determining the divergent validity of both the SE and OE sections of the FSEM were chosen because they all (including outcome expectations) could potentially be factors in determining whether a person is persistent in their efforts to do something. Therefore, it is important that it be determined that they are not all measuring the same thing.

Tests of the concurrent validity (predictive validity) of the FSEM were conducted using the same 72 subjects used in testing the reliability of the scale. A multivariate regression model was developed using Self-Efficacy Expectations, Exercise Self-Efficacy and Outcome Expectations as independent variables. Potential covariates included age, duration of illness, intensity of pain, number of painful sites, family support, friend support and sleep quality. Duration of illness, number of painful sites, pain intensity and social support have previously been found to be confounding variables in some studies using subjects who are experiencing pain. Because sleep disturbance is a factor in fibromyalgia, it was reasoned that quality of sleep could provide some explanation for psychological adjustment in this population. Dependent variables included sickness impact, depression, anxiety, somatization, passive and active styles of coping, use of diverting attention, ignoring, increasing behavior, coping self-statements and catastrophizing as strategies for dealing with pain, number of days off from work or daily activities over the past month, number of days off from work or daily activities over the past year, number of doctor appointments for fibromyalgia symptoms during the past year, and the number of hours worked for pay per week.

Fibromyalgia subjects were provided a packet of materials to fill out. The packets included the FSEM, a questionnaire developed for this study to collect demographic information. The questionnaire also included measures of pain intensity (Visual Analog Scale) and number of painful sites (McGill Pain Inventory). The packets also included the Brief Symptom Inventory, the Coping Strategies Questionnaire, the Pain Management Inventory, the Sickness Impact Profile, Rosenberg's Self-Esteem Scale, The Multidimensional Health Locus of Control, the Conscientiousness Scale of the NEO-Personality Inventory and the Arthritis Self-Efficacy Scale (see measurement section). Those subjects who completed the measurments and signed a consent form (see Appendix A) were included in the study.

Measures

The Fibromyalgia Self-Efficacy Measurement. This instrument provides two scores, a self-efficacy expectation score and an outcome expectation score. The Self-Efficacy Expectation score is an indication of the level of confidence subjects have in their ability to perform specific tasks or skills that are useful in helping persons manage pain, stress and sleep. The Outcome Expectation score measures the level of confidence subjects have that performing those specific tasks or skills will result in a reduction in pain and/or fatigue. Levels of confidence for both scores are measured using a 5-point Likert scale on which a response of 0 indicates that the subject has no confidence, while a response of 4 indicates that the subject is completely confident. In addition, the Self-Efficacy for Exercise Behavior Scale (Sallis, Pinski, Grossman, Patteron, and Nader, 1988), also called the Exercise Confidence Survey, was used to examine the subjects' self-efficacy regarding their ability to make time for exercise and their ability to stick to an exercise program. The alpha coefficients for the two factors of the measurement were shown by Sallis, et al. to be .83 and .85 respectively. Validation procedures indicated that these self-efficacy scores are related to actual exercise behavior. A copy of the FSEM can be found in Appendix A.

Brief Symptom Inventory. The Depression, Anxiety and Somatization scales of the Brief Symptom Inventory (Derogatis, 1993) were used to measure the subjects' current levels of anxiety, depression and somatization. The Brief Symptom Inventory (BSI) is a brief form of the Symptom Checklist-90 (Derogatis, Lipman & Covi, 1973). It is a 53-item inventory containing nine scales or symptom dimensions (Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism). The depression, anxiety and somatization scales have internal consistencies of .85, .81 and .80 respectively, and test-retest reliabilities of .84, .79 and .68 respectively. Subjects are asked to respond to each item on a scale from 0 (not at all) to 4 (extremely) according to how much the problem indicated in the item has caused them distress over the past seven days (see Appendix A)

Sickness Impact Profile. The Sickness Impact Profile (Bergner, Bobbitt, Carter & Gilson, 1981) is a measure of self-perceptions of health status consisting of 136 statements relating to 12 areas of functioning (ambulation, mobility, body care and movement, social interaction, communication, alertness, emotional behavior, sleep and rest, eating, work, home management, and recreation and past-time activities). These 12 areas are combined to form three major dimensions (physical impairment, psychosocial impairment and other impairment). Subjects are asked to check only those statements that describe them on a given day. The Sickness Impact Profile has high internal consistency (.94), high test-retest reliability (.92) and moderate to high convergent and discriminant validity. Clinical validity was determined by assessing the relationship between clinical measures of disease and Sickness Impact Profile (SIP) scores. The SIP has been used in studies of chronic pain (Follick, Smith & Ahern, 1985; Liang, Fossel & Larson, 1990; Romano, Turner, & Jensen, 1992; Subramanian & Rose, 1988; Watt-Watson & Graydon, 1989). A copy of the SIP can be found in Appendix A.

Coping Strategy Questionnaire. The Coping Strategy Questionnaire (Rosentiel & Keefe, 1983) is a 44-item questionnaire that assesses six cognitive strategies (diverting attention, reinterpreting pain sensations, coping self-statements, ignoring pain sensation, praying or hoping, catastrophizing) and one behavioral strategy (increasing behavior) for coping with pain. In addition, there are tow items measuring the ability to control pain and the ability to decrease pain. Items are rated on a 7-point scale with "0" representing "never", and "6" representing "always." The coefficient alphas for the subscales are .85, .85, .72, .81, .83, .78 and .71 for diverting attention, reinterpretation, coping self-statements, ignoring, praying/hoping, catastrophizing and increasing beahavioral activity respectively. Analysis of chronic pain patients found that three factors (cognitive coping and suppression, helplessness and diverting attention or praying are related to behavioral and emotional adjustment to chronic pain (Crisson & Keefe, 1988; Keefe, Caldwell, Martinez, Spinhoven, ter Kuele, Linssen & Gazindan, 1989; Main & Waddel, 1991; Nunley, Beckham & Williams, 1991; Rosentiel & Keefe, 1983; Williams & Keefe, 1991). The three factors accounted for a significant proportion of the variance in average pain, state-anxiety, depression and functional capacity. A copy of the Coping Strategy Questionnaire can be found in Appendix A.

Vanderbilt Pain Management Inventory. The Vanderbilt Pain Management Inventory (Brown & Nicassio, 1987) is a 16-item self-report questionnaire designed to assess the frequency with which chronic pain patients use active and/or passive coping strategies when their pain is at moderate or higher levels of intensity. Active coping strategies are those strategies involving effort on the part of the patient to continue functioning in the presence of pain or to distract him- or herself from pain. A Passive coping strategy involves depending on others for pain control. The internal consistencies of the active and passive scales are .71 and .82 respectively. The test-retest reliabilities measured after 6 months were .65 and .69 for the active and passive scales respectively. In a test for concurrent validity, active coping was found to be negatively associated with pain and functional impairment, while passive coping was found to be positively associated with pain and functional impairment (Brown & Nicassio, 1987). A copy of the Pain Management Inventory can be found in Appendix A.

Multidimensional Health Locus of Control. The Multidimensional Health Locus of Control Scale (Wallston, Wallston & DeVellis, 1978) was designed to measure a person's beliefs about whether their sense of control over health is internal, a matter of chance or under the control of powerful others. This study uses form B of the Multidimensional Health Locus of Control Scale (MHCL). The subject is asked to respond to each statement using a 6-point scale with a response of 1 representing "strongly disagree" and a response of 6 representing "strongly agree." The alpha coefficients for form B are .71 (internal locus of control), .72 (powerful others) and .69 (chance locus of control). Internal locus of control correlated positively with health stats (.43) and chance locus of control was negatively correlated (-.55) with health status. The MHLC has been used in the study of chronic pain and illness including rheumatic illness (Johnson, Magnani, Chan & Ferrante, 1989; Buckelew, Shutty, Hewett & Landon, 1990; Crisson & Keefe, 1988; Hickey & Greene, 1989; Jensen & Karoly, 1991; Pfeiffer & Wetstone, 1988; Williams & Thorn, 1989). Health locus of control has also been used to study coping (Bryant, 1989; Crisson & Keefe, 1988). A copy of the MHLC can be found in Appendix A.

Rosenberg Self-Esteem Scale. The Rosenberg Self-Esteem Scale (Rosenberg, 1965) is a 10-item scale that provides a single score indicating the individual's level of self-esteem. The scale has been used with a variety of medical patient populations (Cella & Tross, 1986; Curbow & Somerfield, 1991; Duffy & MacDonald, 1990; Fitzpatrick, Newman, Lamb & Shipley, 1988; Hopper & Santomier, 1984; Shisslak, Puzda & Crago, 1990; Walsh & Walsh, 1987). Scores range from 0 to 6 with low scores representing high self-esteem. A copy of the Rosenberg Self-Esteem Scale can be found in Appendix A.

Conscientiousness. Permission was attained from Psychological Assessment Resources to use the Conscientiousness scale of the NEO-Personality Inventory-Revised (Costa & McCrae, 1992). The Conscientiousness scale (C) measures the extent to which an individual is likely to plan, organize and carry out tasks. Those who score high on the C scale are strong-willed, purposeful and determined. High C scorers may also be prone toward compulsive neatness, fastidiousness and workaholic behavior. High C scorers are also punctual and reliable. There are six subscales to the Conscientiousness scale: Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, and Deliberation. The coefficient alphas for the subscales are .73, .71, .70, .70, .82 and .73 for competence, order, dutifulness, achievement striving, self-discipline and deliberation respectively. The Conscientiousness scale was included as a measure of divergent validity because both conscientiousness and self-efficacy are theoretically related to the tendency toward carrying out tasks and persistence, therefore, it is important to demonstrate that they are not so strongly related that they may be measuring the same thing. A copy of the Conscientiousness Scale can be found in Appendix A.

Arthritis Self-Efficacy Scale. The Arthritis Self-Efficacy Scale (Lorig, Chastain, Ung, Shoor & Holman, 1989) is a 20-item scale designed to measure arthritis patients' perceived self-efficacy regarding their ability to control pain and other symptoms and their ability to function. It is divided into three factors: pain management (PSE), Physical Functioning (FSE) and Other Arthritis Symptoms (OSE). Tests indicate that the Arthritis Self-Efficacy Scale meets the standards of construct and concurrent validity and test-retest reliability. The test-retest reliabilities were found to be .87, .85, and .90 for PSE, FSE and OSE factors respectively. The internal consistencies were .93 and .90 for FSE and OSE factors respectively. The responses to FSE items were positively correlated with the actual performance of the tasks assessed by those items (Lorig et al., 1989). This scale is different from the Fibromyalgia Self-Efficacy measurement in that the statements for each item are stated in more general terms. For example, while the Arthritis Self-Efficacy Scale has subjects respond to statement such as "How certain are you that you can control your fatigue" or How certain are you that you can decrease your pain quite a bit"; the FSEM asks about subjects' ability to perform specific behaviors that can lead to a reduction in pain or fatigue (see Appendix A). The FSEM also differentiates between self-efficacy expectations and outcome expectations. The instrument has been used in several studies (O'Leary, Shoor, Lorig, & Holman, 1988; Stewart & Kruger, 1991).

McGill Pain Questionnaire. Two parts of the McGill Pain Questionnaire (Melzack, 1975) were used in this study. Part I was used to assess the number of painful sites. Subjects are asked to indicate on drawings the areas of the body in which they feel pain. The Visual Analog Scale was used to measure pain intensity. Subjects are asked to rate their pain along a 10 cm. line which is anchored by "no pain" at one end and "worst possible pain" at the opposite end of the line. Please see the last page of the Fibromyalgia Questionnaire in Appendix A for a copy of this scale.

Fibromyalgia Questionnaire. This instrument is a questionnaire designed for this study for the purpose of collecting demographic information (see Appendix A). In addition, it includes a visual analog scale consisting of a 10 cm line with extremes of "no pain" and "pain as bad as it could be" anchoring the scale. Subjects are asked to place a mark on the line at a point representing their current level of perceived pain intensity. The score is obtained by measuring the distance from the "no pain" point to the mark placed on the line by the subject. The questionnaire also includes an item designed to determine the duration of fibromyalgia pain. Subjects were asked to indicate the date (month and year) in which they first experienced their fibromyalgia symptoms. Duration was calculated by counting the number of months from the time of onset to the date on which they responded to questionnaire. A copy of the Fibromyalgia Questionnaire can be found in Appendix A.

Social Support. Social support has been shown to be related to psychosocial adjustment in chronic pain populations (Faucett & Levine, 1991; Gil, Keefe, Crisson & Van Dalfsen, 1987; Kleinke, 1988; Subramanian, 1991; Turner, Clancy, Vitaliano, 1987). This study makes use of a measure that examines social support from three sources: family, friends, and work environment. Because not all subjects were working, only support from family and friends was used in this study. It is a measurement included in a book on stress management by Jaffe (1984). In addition, the Social Support and Exercise

Survey (Sallis, Grossman, Pinski, Patterson & Nader, 1987) was used as a measure of how supportive family members and friends are toward the subjects' need to exercise regularly.

Research Questions and Hypotheses

The following research questions and hypotheses were addressed in this study:

1. It is expected that correlations of Fibromyalgia Self-efficacy Expectation and Outcome Expectation scores with scores on Self-Esteem, Multidimensional Health Locus of Control and Conscientiousness will be low to moderate, if the FSEM is measuring something other than global self-esteem, conscientiousness and locus of control. It is expected that correlations of Fibromyalgia Self-Efficacy scores and Arthritis Self-Efficacy scores will be moderate to high.

Hypotheses related to psychological adjustment

Do current scores on the FSEM predict current levels of anxiety, depression and somatization? Hypotheses 2-9 address this research question.

2. Those with high self-efficacy expectations will show low levels of anxiety (H : Beta = 0; H : Beta < 0).

3. Those with high outcome expectations will have low levels of anxiety (H : Beta = 0; H : Beta < 0)

4. High self-efficacy scores will be predictive of low depression scores (H : Beta = 0; H : Beta < 0).

5. High outcome expectation scores will be predictive of low depression scores (H : Beta = 0; H : Beta < 0).

6. Anxiety will be more strongly related to self efficacy expectations than to outcome expectations.

7. Outcome expectations will be more strongly related to depression than to self-efficacy expectations.

8. High self-efficacy expectation scores will be related to low somatization scores (H : Beta = 0; H : Beta < 0).

9. High outcome expectations scores will be related to low somatization scores (H : Beta = 0; H : Beta < 0).

Hypotheses related to coping

Does the level of self-efficacy for performing stress, pain and sleep managment techniques predict the tendency to report using active rather than passive styles of coping with symptoms and are FSEM scores predictive of the reported use of specific coping strategies? This research question is addressed by hypotheses 10-21.

10. High self-efficacy expectation scores will be preditive of low Passive scores on the Pain Management Inventory (H : Beta = 0; H : Beta < 0).

11. High outcome expectation scores will be preditive of low Passive scores (H : Beta = 0; H : Beta < 0).

12. High self-efficacy expectation scores will be predictive of high Active scores on the Pain Mangement Inventory (H : Beta = 0; H : Beta >0).

13. High outcome expectation scores will be predictive of high Active scores (H : Beta = 0; H : Beta > 0).

14. High self-efficacy scores will be predictive of high scores on the Ignoring scale of the Coping Strategies Questionnaire (H : Beta = 0; H : Beta > 0).

15. High outcome expectation scores will be predictive of high Ignoring scores (H : Beta = 0; H : Beta > 0).

16. High self-efficacy scores will be predictive of high Diverting Attention scores on the Coping Strategies Questionnaire (H : Beta = 0; H : Beta > 0).

17. High outcome expectation scores will be predictive of high scores on the Diverting Attention scale of the Coping Strategies Questionnaire (H : Bet = 0; H : Beta > 0).

18. High self-efficacy expectation scores will be predictive of high Coping Self-Statement scores on the Coping Strategies Questionnaire (H : Beta = 0; H : Beta > 0).

19. High outcome expectation scores will be predictive of high Coping Self-Statement scores (H : Beta = 0; H : Beta > 0).

20. High self-efficacy expectation scores will be predictive of low scores on the Catastrophizing scale of the Coping Strategies Questionnaire (H : Beta = 0; H : Beta < 0).

21. High outcome expectation scores will be predictive of low Catastrophizing scores (H : Beta = 0; H : Beta < 0).

Hypotheses related to sickness impact

Do FSEM scores predict the amount of impact fibromyalgia symptoms have on patients? This question is addressed by hypotheses 22-23.

22. High self-efficacy scores will be predictive of low Sickness Impact Profile scores (H : Beta = 0; H : Beta < 0).

23. High outcome expectation scores will be predictive of low Sickness Impact Profile scores (H : Beta = 0; H : Beta < 0).

Hypotheses related to use of medication

Do individuals' FSEM scores predict current amount of medication use?

24. High self-efficacy expectation scores will be predictive of a low number of medications used for fibromyalgia symptoms (H : Beta = 0; H : Beta < 0).

25. High outcome expectation scores will be predictive of a low number of medications used for fibromyalgia symptoms (H : Beta = 0; H : Beta < 0).

Hypotheses related to psychosocial adjustment

Do FSEM scores predict the number of days individuals have taken off from work or daily activities during the past month or year? These questions are addressed by hypotheses 26-31.

26. High self-efficacy scores will be predictive of a low number of days taken off from work or daily activities during the past month (H : Beta = 0; H : Beta < 0).

27. High outcome expectation scores will be predictive of a low number of days taken off from work or daily activities during the past month (H : Beta = 0; H : Beta < 0).

28. High self-efficacy scores will be predictive of a low number of days taken off from work or daily activities during the past year (H : Beta = 0: H : Beta < 0).

29. High outcome expectation scores will be predictive of a low number of days taken off from work or daily activities during the past year (H : Beta = 0; Beta < 0).

30. High self-efficacy scores will be predictive of a high number of hours spent working per week (H : Beta = 0; H : Beta > 0).

31. High outcome expectation scores will be predictive of a high number of hours spent working per week (H: Beta = 0; H : Beta > 0).

The hypotheses related to use of medication and psychosocial adjustment are based on self-efficacy theory's prediction that those who believe they are able to perform skills are likely to be more persistent in using those skills. Taken a step further, it is believed that if fibromyalgia patients apply the skills included in the FSEM, they are more likely to be better able to manage their symptoms themselves (fewer visits to physicians) and are less likely to be having to take days off from normal daily activities.

Hypotheses related to exercise

Do Exercise self-efficacy scores predict the number of types of exercises attempted and the amount of time one has actually spent exercising during the past week? These questions are addressed in hypotheses 32-33.

32. High Exercise Self-Efficacy Expectation scores will be predictive of a high number of minutes spent exercising during the past week (H : Beta = 0; H : Beta > 0).

33. High Exercise Self-Efficacy Expectation scores will be predictive of the number of types of exercises attempted during the past week (H : Beta = 0; H : Beta > 0).

CHAPTER 4

RESULTS

Reliability and Validity

Content Validity. The first step in determining the content validity of the FSEM was to have experts judge whether the items are measuring self-efficacy expectations (section 1) and outcome expectations (section 2). The form containing all of the potential items was distributed to 20 raters. All raters had masters or doctoral degrees in the areas of psychology or social work. All had prior knowledge of self-efficacy theory. Raters were asked to indicate on the form (by circling "yes" or "no") whether they believed the items measure self-efficacy or outcome expectations. Sixteen of the 20 completed and returned the forms. For the items in Section 1, 10 of the 16 raters indicated that they believed all of the items in section 1 were measuring self-efficacy expectations. One of those 10 raters made some suggestions on re-wording some items. Eighteen (30%) of the 30 items received 100% agreement from raters that they do measure self-efficacy based on the definition provided. An additional 7 items met the 85% criterion to be retained, leaving 5 items that did not meet the criterion of 85% agreement. For items in section 2 (outcome expectations), 4 of the 24 items received 100% agreement from the raters, 13 items received 93% agreement, 3 items received 87% agreement and the remaining 4 items failed to meet the 85% agreement criterion. Three of the 4 items failing to meet the criterion were negatively stated.

Although 38% (6) of the first set of raters indicated that negatively stated outcome expectation items may not be measuring outcome expectations, these items were retained for the second step in the validation procedure. The reason for that decision was that several of the six raters reported that they had entered the task with the mind-set that the writer had intentionally placed some items in the inventory that would not be measuring self-efficacy or outcome expectations. Because the negatively stated items stood out as being different from the majority of the items, they became targets for rejection.

The second group of raters was asked to make judgments on 7 self-efficacy items. Five of the 7 were reworded based on the suggestions of the first group of raters. The other two were items that had attained 87% agreement by the first set of raters. Based on the suggestion of the first set of raters, 18 outcome expectation items were reworded. One of the members of the first group of raters suggested that all outcome expectation items be worded so that the items indicated that performing a specific behavior "will" or "will not" result in a specified outcome. For example, one item was changed from "Managing or reducing stress helps me reduce my fibromyalgia symptoms" to "Managing or reducing stress will reduce my fibromyalgia symptoms." The revised items were distributed to the 22 raters composing the second group. Fourteen (63.6%) of the raters completed and returned the forms. All items met the 85% agreement criterion for retention. These items were combined with the 23 items in section 1 and the other 6 items from section 2 that were retained following ratings by the first group, resulting in 30 items for section 1 and 24 items for section 2. The FSEM is included in Appendix A. Table B1 in Appendix B summarizes the results attained from the two sets of raters.

Internal Consistency. The internal consistency of the FSEM was determined using the responses of the 72 subjects who returned completed packets. The internal consistency of the two sections of the FSEM was determined using the *SPSS Professional Statistics* program. When all 30 items of the self-efficacy expectations section (section 1) were included in the analysis, the alpha level was .79. The analysis indicated that the internal consistency of section 1 could be improved by removing items 14 and 21. After removing those items, the alpha level was .89. The alpha level of the outcome expectations section (section 2) when all 24 items were included was .84. Removal of item 23 resulted in an alpha level of .88.

Split-half Reliability. Using the 28 items remaining after the evaluation of the internal consistency, the split-half reliability of section 1 was analyzed. Items were split into odd and even items. The Guttman split-half reliability coefficient was .93 for section 1. The remaining 23 items in section 2 were also split into odd and even items. The Guttman coefficient for section 2 was .90.

Prior to carrying out tests of convergent and divergent validity, the frequency distributions of the scores for each section were examined for outliers that may make the mean a poor predictor of the population mean. Although the sample size was small, the ranges for the two subscales were large enough to allow for enough variance to be analyzed. Distributions of the responses to each item are presented in Tables B1 and B2 in Appendix B. The possible ranges for the SE and OE sections are 0-120 and 0-96 respectively. The actual range found for the SE section in this sample was 68 (30-98) and the actual range for the OE section was 63 (29-92). Frequency distributions and scatter plots were examined to determine whether outliers may exist. As can be seen from Figures 1 and 3, the distributions of the two sections were not highly skewed. Skewness values for the SE and OE sections were .28 and -.46 for the self-efficacy and outcome expectation distributions respectively. The scatter plots for both the SE and OE sections, shown in figures 2 and 4, indicate that the subjects' scores represent a broad range of scores with score spread throughout the range rather than the majority clustering around a few points. There are no extreme outliers that would distort the mean. The means for the two sections of the FSEM should provide a good representation of central tendency.

Divergent and Convergent Validity. The two sections of the FSEM, self-efficacy expectations and outcome expectations were correlated to determine whether or not it is likely that they are measuring different things. The correlation coefficient was .2454. Although this coefficient is significant, the strength of the relationship is fairly low. Exercise self-efficacy was more highly correlated with the self-efficacy expectation section

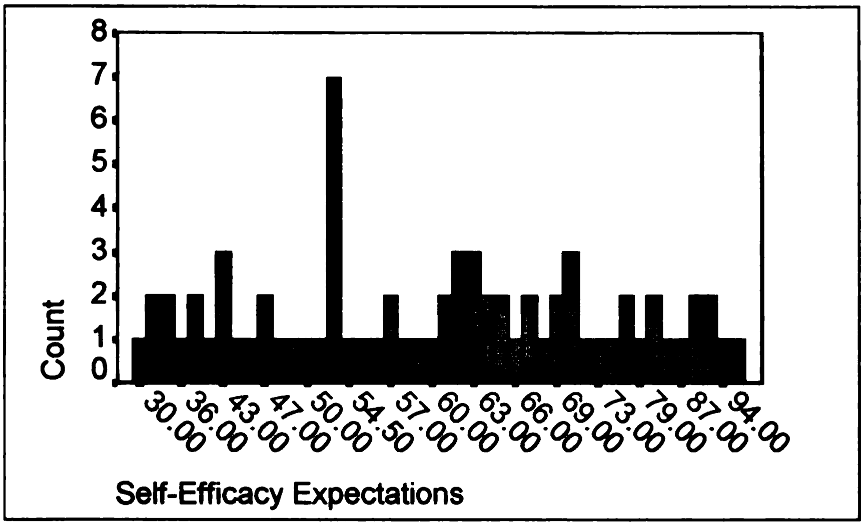

Figure 1. Frequency Distribution of Subject's Self-Efficacy Expectation Scores.

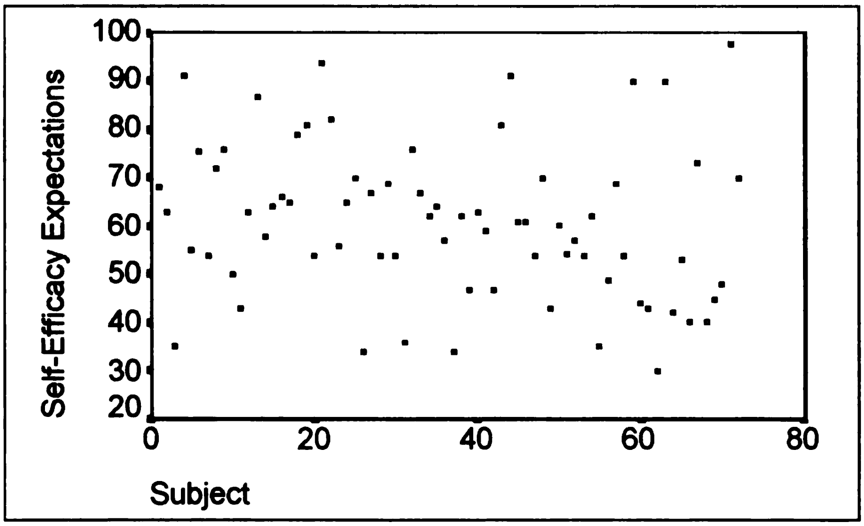

Figure 2. Scatter Plot of Subject's Self-Efficacy Expectation Scores.

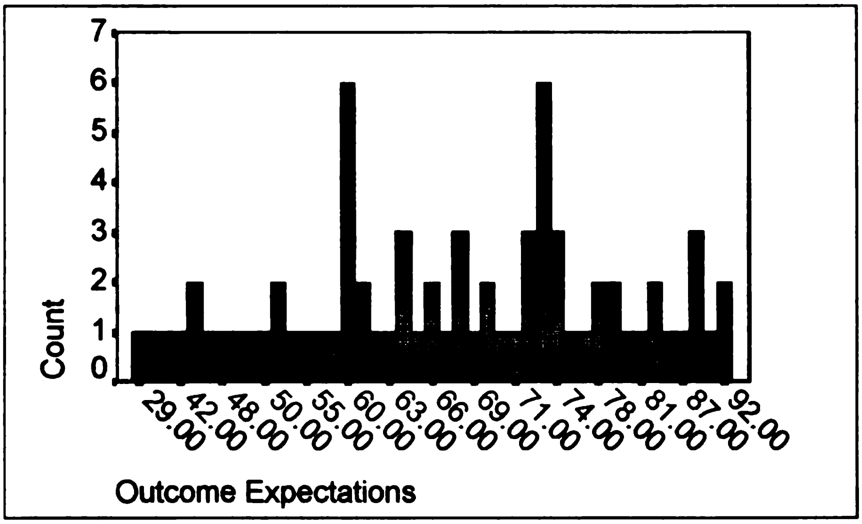

Figure 3. Frequency Distribution of Subject's Outcome Expectation Scores.

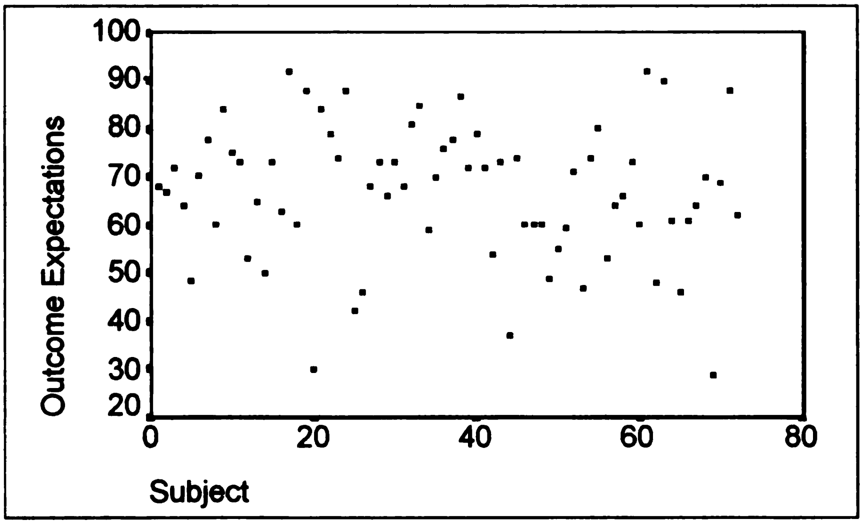

Figure 4. Scatterplot of Subject's Outcome Expectation Scores.

(.3691) of the FSEM than it was to outcome expectations (.1981). This also suggests that the outcome expectations section is different from self-efficacy expectations.

In order to test the divergent validity of the FSEM, the two sections were correlated with scores on the Rosenberg Self-Esteem scale, the Multidimensional Health Locus of Control and the Conscientiousness scale of the NEO-PI. The correlations are shown in Table 2. The mean scores and standard deviations of the above instruments are shown in Table 3, along with published means from validation studies which provide a basis for interpretation. None of the means in the current study are significantly different from the published means.

Table 2

Correlations Between FSEM, Self-Esteem, Locus of Control, and Conscientiousness

	Self-Efficacy Expectations	Outcome Expectations
Rosenberg Self-Esteem	*-.4595	-.1092
Internal Locus of Control	* .3319	* .3801
External (Chance) Locus of Control	*-.4205	*-.2321
Powerful Others	-.1163	-.0610
NEO-PI Conscientiousness	* .3450	* .2936

* Significant at the .05 level

The self-efficacy scores were moderately related to self-esteem (-.4595). The negative correlation is due to the fact that high scores on the Rosenberg Self-Esteem scale indicate a low level of self-esteem. Outcome expectation scores were found to be only slightly related to self-esteem scores (-.1092). Both self-efficacy and outcome expectations were moderately correlated with internal locus of control, with correlation coefficients of .3319 and .3801 respectively. Both sections of the FSEM were negatively related to Chance locus of control (-.4205 for self-efficacy expectations and -.2321 for outcome expectations), and negatively related to the tendency toward relying on powerful others to maintain health (-.1163 for self-efficacy expectations and -.0610 for outcome expectations). Both self-efficacy expectations and outcome expectations were moderately related to conscientiousness with correlations of .3450 and .2936 respectively.

The convergent validity of the FSEM was tested by correlating the FSEM scores with scores on the Arthritis Self-Efficacy Scale. The correlations are shown in Table 4. The self-efficacy expectation scores on the FSEM were moderately related to scores on the Arthritis Self-Efficacy Scale. Scores on the FSEM self-efficacy expectations section followed a consistent pattern, but they were not much more strongly related to most of the scores on the Arthritis Self-Efficacy Scale than they were to the measures used to determine the divergent validity. However, a correlation of .5467 is strong enough to establish the convergent validity. Outcome expectations scores were moderately related to most Arthritis Self-Efficacy Scale scores, but the relationships were not as strong as those found between the self-efficacy expectation scores and the Arthritis Self-Efficacy Scale scores.

The above results support the expectation (hypothesis 1) that FSEM scale scores represent something different from global self-esteem, locus of control and conscientiousness. The results indicate that the FSEM and Arthritis Self-Efficacy Scale are not highly related and are not likely to be measuring the same thing.

The above results support the expectation (hypothesis 1) that FSEM scale scores represent something different from global self-esteem, locus of control and conscientiousness are not highly related and are not likely to be measuring the same thing.

Table 3

Mean Scores and Standard Deviations of the Fibromyalgia Subjects and Published Comparative Samples on Measurements used to Determine the Divergent Validity of the FSEM

Variable	Subject Mean	Standard Deviation	Non-Patient/Patient[a] Mean
Self-Esteem	2.25	1.79	3 (medium level)
Multidimensional Health Locus of Control			
Internal Locus of Control	24.03	4.45	25.55
Chance Locus of Control	18.08	5.54	16.72
Powerful Others	17.39	5.48	19.16
Conscientiousness (NEO-PI-R)	45.31	11.57	30.71
Competence	22.83	5.27	25.00
Order	18.56	4.97	19.40
Dutifulness	24.31	4.68	25.10
Achievement Striving	19.51	4.95	20.70
Self-Discipline	20.26	5.24	23.40
Deliberateness	19.94	4.33	20.80
Arthritis Self-Efficacy			
Pain	28.65	10.01	52.04[a]
Functioning	67.68	18.97	73.27[a]
Other	37.92	12.45	55.62[a]

[a] Indicates data from a rheumatoid arthritis sample

Concurrent Validity. A multivariate regression analysis using the *SPSS Advanced Statistics* program was performed to test the remaining hypotheses which are all related to concurrent validity. The covariates in the model included: family support, friend support, age, pain intensity, number of painful sites, duration of pain and sleep quality. The independent variables included: self-efficacy expectations, exercise self-efficacy, and outcome expectations. The dependent variables included: anxiety, depression, somatization, active coping style, passive coping style, catastrophizing, diverting attention ignoring, coping self-statements, sickness impact, number of medications taken for fibromyalgia symptoms, hours worked for pay per week, number of days taken off from daily activities or work during the past month and during the past year, the amount of time spent exercising during the past week and the number of types of exercises attempted during the past week. The hypotheses are directional, therefore, one tailed t-tests were employed in the univariate analyses. Mean scores and standard deviations of the predictor and dependent variables are shown in Table 5.

Table 4

Correlations Between Variables used to Determine the Convergent Validity of the FSEM

	Self-Efficacy Expectations	Outcome Expectations
Arthritis Self-Efficacy	*.5467	*.4263
Arthritis Pain	*.5314	*.4775
Arthritis Function	*.3493	*.3177
Arthritis Other	*.5879	*.3398

The first step in the analysis was to determine whether multicollinearity was a problem in the model chosen. The intercorrelations of the predictor variables are shown in Table 6. The self-efficacy expectation scores on the FSEM were moderately related to scores on

Table 5

Mean Scores and Standard Deviations of Predictor and Dependent Variables

Variable	Mean	Standard Deviation	Non-Patient / Patient[ab] Mean
Age (years)	45.10	11.42	
Duration of Pain (months)	98.03	79.00	
Number of Painful Sites	22.60	20.97	
Sleep Quality (0-10)	4.36	2.24	
Pain Intensity (0-10)	5.90	2.68	
Self-Efficacy	60.81	15.99	
Outcome Expectations	66.72	14. 11	
Exercise Self-Efficacy	37.19	11.60	
Depression (BSI)	1.06	.92	.28
Anxiety (BSI)	1.16	.92	.35
Somatization (BSI)	1.50	.74	.29
Active Coping (Pain Management Inventory)	22.67	4.84	20.80
Passive Coping (Pain Management Inventory)	31.60	7.23	31.80
Ignoring (CSQ)	15.51	8.86	9.76[b]
Diverting Attention (CSQ)	14.56	6.69	17.49[b]
Praying/Hoping (CSQ)	15.64	8.39	22.37[b]

Table 5 (Cont'd)

Variable Mean	Mean	Standard Deviation	Non-Patient / Patient^{ab}
Increasing Behavior (CSQ)	19.22	5.20	16.73^{b}
Coping Self-Statements (CSQ)	22.04	6.53	19.35^{b}
Reinterpretation	7.54	6.43	5.30^{b}
Catastrophizing (CSQ)	11.79	8.05	17.10^{b}
Sickness Impact	24.58	15.96	3.00
Time spent exercising (minutes in past week)	238.34	291.32	
Number of types of exercises attempted during past week	1.71	1.25	
Number of physician appointments past 12 months	9.55	13.48	

Note: [a] Indicates data from a rheumatoid arthritis group (Brown & Nicassio, 1987), [b] indicates data from a chronic pain group (Keefe, 1992).

Table 6

Correlation Matrix for Predictor Variables

	Age	Duration	Intensity	Sites	Sleep Q	Family Support	Friend Support	SE	Exercise SE	Outcome Expectations
Age	1.00	.17	-.10	-.09	.19	-.00	.06	.08	-.27	.17
Duration	.17	1.00	.25	.26	.02	.01	.07	.04	-.02	.14
Intensity	-.10	.25	1.00	.28	-.12	-.11	.08	-.14	-.18	-.09
Number of sites	-.09	.26	.28	1.00	-.18	-.16	.21	.05	-.15	.17
Sleep Quality	.19	.02	-.12	-.17	1.00	.22	-.18	.27	.03	.11
Family Support	-.00	.01	-.11	-.16	.22	1.00	-.62	.40	.22	-.03
Friend Support	.06	.07	.08	.21	-.19	-.62	1.00	.30	-.13	.06
Self-Efficacy	.08	.04	-.14	.05	.27	.40	-.30	1.00	.37	.25
Exercise Self-Efficacy	-.27	-.02	-.18	-.15	.03	.22	-.13	.40	1.00	.20
Outcome Expectations	-.17	.14	-.09	.17	.11	-.03	.06	.25	.20	1.00

the Arthritis Self-Efficacy Scale. Scores on the FSEM self-efficacy expectations section were more strongly related to most of the scores on the Arthritis Self-Efficacy Scale than they were to the measures used to determine the divergent validity. Outcome expectations scores were moderately related to most Arthritis Self-Efficacy Scale scores, but the relationships were not as strong as those found between the self-efficacy expectation scores and the Arthritis Self-Efficacy Scale scores. Lewis-Beck (1980) suggests that the best way to determine whether multicollinearity presents a problem is to regress each independent variable on all other independent variables. If any of the R^2 is near 1.0, there is high multicollinearity. When this procedure was followed, the highest R^2 found was .45, indicating that multicollinearity does not present a problem in this study.

Six multivariate regression analyses were performed. The first used covariates (age, pain duration, pain intensity, number of painful sites, sleep quality, family support and friend support) alone as predictors. There was not sufficient data in the literature to indicate which covariates should be entered first, therefore, all covariates were entered together. The variance explained by each covariate was based on holding all other covariates constant (unique method). Multivariate degrees of freedom were (7, 27) and univariate degrees of freedom were (7,64). The second through fourth analyses used the covariates plus one independent variable as predictors. The multivariate degrees of freedom were (8, 26) and the univariate degrees of freedom were (8, 63). The fifth analysis used covariates along with both self-efficacy expectations and outcome expectations as predictors. The multivariate degrees of freedom were (9, 25) and the univariate degrees of freedom were (9, 62). The final multivariate regression used all three independent variables (SE, OE and Exercise self-efficacy) with the covariates. The multivariate degrees of freedom were (10, 24) and the univariate degrees of freedom were (10, 61). The results of the multivariate regression analyses are shown in Tables B4-B9 and a table of beta weights (Table B10) and can be found in Appendix B. Table 7

Table 7

Summary of Proportion of Variance in Dependent Variables Explained by Multivariate Regression Analyses Models

Dependent Variable	R^2 Covariates	R^2 Cov + SE	R^2 Cov + OE	R^2 Cov + ExSE	R^2 Cov + SE +OE	R^2 Cov + SE + OE + ExSE
Depression	.3712	.4259	.4081	.3736	.4452	.4481
Anxiety	.2333	.4578	.3084	.2652	.4842	.4844
Somatization	.2603	.4014	.3136	.3055	.4218	.4259
Active Coping	.1021	.3109	.2985	.2359	.4272	.4603
Passive Coping	.1259	.2450	.1583	.1261	.2546	.2813
Diverting Attention	.1016	.2795	.1674	.1513	.3042	.3073
Ignoring	.0304	.1495	.1798	.0740	.2463	.2499
Increasing Behavior	.0874	.2012	.2883	.1404	.3431	.3497
Pray/Hope	.1122	.1189	.1125	.1502	.1189	.1790
Reinterpretation	.0949	.1212	.1948	.1347	.2023	.2187
Coping Self-Statements	.0844	.2067	.1873	.1641	.2653	.2859

Table 7 (Cont'd)

Dependent Variable	R^2 Covariates	R^2 Cov + SE	R^2 Cov + OE	R^2 Cov + ExSE	R^2 Cov + SE +OE	R^2 Cov + SE + OE + ExSE
Time Spent Exercising in minutes/week	.0671	.0717	.1113	.0998	.1265	.1609
Number of Types of Exercises Attempted in past week	.2022	.2819	.2024	.2365	.2890	.2971
Number of Appointments with Physician in Past Year	.2440	.2474	.2462	.2457	.2514	.2521
Days off from Daily Activities or Work During Past Month	.0701	.0703	.0780	.0719	.0795	.0818
Days off from Daily Activities or Work During Past Year	.1260	.1274	.1266	.1260	.1285	.1287
Number of Medications	.1594	.1712	.2234	.1606	.2257	.2358

Table 7 (Cont'd)

Dependent Variable	R^2 Covariates	R^2 Cov + SE	R^2 Cov + OE	R^2 Cov + ExSE	R^2 Cov + SE +OE	R^2 Cov + SE + OE +ExSE
Hours at Work/Week	.0950	.0952	.1070	.1220	.1072	.1342
Sickness Impact (total)	.5052	.5636	.5232	.5283	.5283	.5730
SI Physical	.4201	.4680	.5000	.4672	.5240	.5402
Ambulation	.4437	.4733	.4839	.4860	.4860	.5194
Mobility	.2918	.3318	.3458	.2939	.3675	.3699
Body Care and Movement	.4048	.4579	.4857	.4588	.5131	.5324
SI Psychosocial	.4722	.4680	.4984	.5349	.5476	.5721
Social Interaction	.5615	.5615	.5679	.5850	.5715	.5933
Alertness Behavior	.3803	.4168	.3811	.4172	.4172	.4344
Emotional Behavior	.2100	.3170	.2374	.2720	.3246	.3410
Communication	.3143	.3678	.3537	.3489	.3891	.3982

Table 7 (Cont'd)

Dependent Variable	R^2 Covariates	R^2 Cov + SE	R^2 Cov + OE	R^2 Cov + ExSE	R^2 Cov + SE +OE	R^2 Cov + SE + OE +ExSE
Sleep and Rest	.3043	.3210	.3361	.3066	.3438	.3440
Eating	.1231	.1354	.1251	.1327	.1357	.1392
Work	.1163	.1671	.1625	.1624	.1682	.1685
Home Management	.3971	.4325	.4454	.4015	.4645	.4691
Recreation and Pastime	.2785	.3112	.2881	.2797	.3328	.3430

summarizes the proportion of the variance in each dependent variable that is accounted for by each of the multivariate models.

Hypotheses related to psychological adjustment

Hypothesis 2 states that those with high levels of self-efficacy expectations regarding their ability to carry out pain, stress, and sleep management techniques will have low levels of anxiety. Self-efficacy was a significant predictor of anxiety, both when SE was entered with the covariates alone (beta = -.5432; standard error = .006; t = -5.107, p = .001) and when entered with the other two independent variables (beta = -.50237; standard error = .007; t = -4.314; p = .001). The relationship was in the expected direction.

Hypothesis 3 states that those with high outcome expectations regarding the ability of pain, stress and sleep management techniques to result in a reduction in fibromyalgia symptoms will show low levels of anxiety. When outcome expectations was placed in the model alone with the covariates, outcome expectations was a significant predictor of anxiety (beta = -.2955; standard error = .007; t = -2.617; p = .011). When the other two independent variables were added to the model, outcome expectations was no longer significant (beta = -.1818; standard error = .007; t = -1.773; p = .081). The only other variable in the model that was significantly related to anxiety was age (beta =-.2067; p = .05). The younger the subject, the greater the anxiety.

Hypothesis 4 states that high self-efficacy expectations will be predictive of low depression scores. This hypothesis was supported. When self-efficacy was placed in the model with the covariates alone, self-efficacy was a significant predictor of depression. The covariates alone explained 37.12% of the variance in depression. When self-efficacy was added to the model, it explained an additional 5.42% of the variance in depression. The strongest predictor of depression was family support (beta = -.4130; standard error = .012; t = -3.214; p = .002).

Hypothesis 5 states that high outcome expectations will be related to low scores on depression. This hypothesis was supported when outcome expectations was entered into the model alone with the covariates (beta = -.2071; standard error = .007; t = -1.982; p = .052). However, when the other two independent variables were included in the model only self-efficacy expectations and family support were significant predictors of depression, with family support being the stronger predictor.

Hypothesis 6 states that anxiety will be more strongly related to self-efficacy expectations than to outcome expectations. This hypothesis was supported. When both self-efficacy and outcome expectations were placed in the model together, only self-efficacy expectations was a significant predictor of anxiety (p = .040 for self-efficacy; p = .14 for outcome expectations).

Hypothesis 8 states that high self-efficacy scores will be related to low somatization scores. This hypothesis was supported (beta = -.3599; standard error = .006; t = -2.929; p = .005).

Hypothesis 9 states that high outcome expectation scores will be related to low somatization scores. When outcome expectations was entered into the model as the only independent variable, it was a significant predictor of somatization (p = .031). However, when all three independent variables were placed in the model, only self-efficacy expectations and pain intensity were significant predictors of somatization.

Hypotheses related to coping

Hypothesis 10 states there will be a negative relationship between self-efficacy and passive scores on the Pain Management Inventory. This hypothesis was supported (beta = -.4411; standard error = .062; t = -3.209; p = .002).

Hypothesis 11 states that there will be a negative relationship between outcome expectations and passive scores. Although the relationship was negative (-.1224), the results were not significant (p = .32). The null hypothesis was retained. The only significant predictor of a passive approach to coping was self-efficacy expectations. Age approached significance (p = .06) with older subjects more likely to report a passive approach than younger subjects.

Hypothesis 12 states that there will be a positive relationship between self-efficacy and active scores on the Pain Management Inventory. This hypothesis was supported (beta = .3418; standard error = .036; t = 2.869; p = .006).

Hypothesis 13 states that there will be a positive relationship between outcome expectations and active scores. This hypothesis was supported (beta = .3641; standard error = .036; t = 3.470; p = .001).

Hypothesis 14 states that there will be a positive relationship between self-efficacy expectations and the reported use of ignoring as a way of coping. This hypothesis was supported (beta = .2775; standard error = .078; t = 1.976; p = .053).

Hypothesis 15 states that there will be a positive relationship between outcome expectations and the reported use of ignoring as a way of coping. The hypothesis was supported (beta = .3410; standard error = .078; t = 2.758; p = .008).

Hypothesis 16 states that there will be a positive relationship between self-efficacy and the reported use of diverting attention as a way of coping. This hypothesis was supported (beta = .4125; standard error = .057; t = 3.057; p = .003).

Hypothesis 17 states that there will be a positive relationship between outcome expectations and the reported use of diverting attention. When outcome expectations was entered into the model as the only independent variable, it was a significant predictor of the reported use of diverting attention (beta = .2764; standard error = .059;; t = 2.231; p = .029). When all three independent variables were entered into the model, outcome expectations was no longer a significant predictor of diverting attention (beta = .1704; standard error = .056; t = 1.434; p = .157).

Hypothesis 18 states that there will be a positive relationship between self-efficacy expectations and the reported use of coping self-statements as a strategy for coping. Self-efficacy was not a significant predictor (p = .057), it did not meet the criterion of .05.

Hypothesis 19 states that there will be a positive relationship between outcome expectations and the reported use of coping self-statements as a strategy for coping. This hypothesis was supported (beta = .2573; standard error = .056; t = 2.133; p = .037).

Hypothesis 20 states that there will be a negative relationship between self-efficacy expectations and the reported use of catastrophizing as a strategy for coping. This hypothesis was supported (beta = -.3631; standard error = .066; t = -2.755; p = .008).

Hypothesis 21 states that there will be a negative relationship between outcome expectations and the reported use of catastrophizing. This hypothesis was not supported (p = .63).

Hypotheses Related to Sickness Impact

Hypothesis 22 states that self-efficacy expectations will be negatively related to total Sickness Impact Profile scores. This hypothesis was supported (beta = -.2278; standard error = .106; t = 2.150; p = .036).

Hypothesis 23 states that outcome expectations will be negatively related to total Sickness Impact Profile scores. This hypothesis was not supported (p = .39). The null hypothesis was retained. The number of painful sites, family support and self-efficacy expectations were significant predictors of Sickness Impact scores with probabilities of .016, .010, and .036 respectively. The lower the number of painful sites, the greater the self-efficacy scores and the greater the perceived support from family, the lower the Sickness Impact Profile scores. Table 8 shows the items on the Sickness Impact Profile that were endorsed by 50 percent or more of the subjects.

Although no hypotheses were suggested regarding the relationship of the independent variables to the 12 categories and physical and psychosocial scores of the Sickness Impact Profile, they were included in the analysis. Significant predictors of physical impairment were the number of painful sites (p = .001) and outcome expectations (p = .01). The greater the number of painful sites, the greater the physical impairment. High outcome expectations were related to lower physical impairment scores. Family support, friend

Table 8

Sickness Impact Profile Items Endorsed by Fifty-Percent or More of the Subjects

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I sleep less at night, for example, wake up too early, don't fall asleep for a long time, awaken frequently (61%)

I keep rubbing or holding areas of my body that hurt or are uncomfortable (54.2%)

I stand for only short periods of time (51.4%)

I change positions frequently (70.8%)

I do work around the house only for short periods of time or rest often (59.7%)

I am doing less of the regular daily work around the house than I usually do (65.3%)

I am not doing heavy work around the house (59.7%)

I am going out less to visit people (52.8%)

I am doing fewer social activities with groups of people (59.7%)

I have more minor accidents, for example, drop things, trip and fall, bump into things (52.8%)

I forget a lot, for example, things that happened recently, where I put things, appointments (61.1%)

I make more mistakes than usual (52.8%

I have difficulty doing activities involving concentration and thinking (51.4%)

I am going out for entertainment less often (65.3%)

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support and self-efficacy expectations were the only significant predictors of psychosocial impairment (p = .024, p = .016 and .052 respectively).

Self-Efficacy expectations was a significant predictor of emotional behavior and impairment in recreational and pastime activities. High self-efficacy scores were related to lower emotional behavior scores. Outcome expectation scores were predictive of body care and movement (p = .01), but were not significant predictors of home management scores (p = .059). Sleep and rest scores of the SIP were predicted by sleep quality and family support scores.

The number of painful sites was a significant predictor of body care and movement (p = .003), home management (p = .001), ambulation (p = .001), communication (p = .005), mobility (p = .008), and physical impairment (p = .001) scores. Pain intensity was predictive of home management scores (p = .001). Age was a significant predictor of alertness (p = .035). Duration of illness was a significant predictor of recreational past-time activity impairment (p = .027). The longer the duration of the illness the lower the impairment in this area.

Hypotheses Related to use of Medication and Appointments with Physicians

Hypothesis 24 states that the number of medications used for fibromyalgia symptoms will be negatively related to self-efficacy. This hypothesis was not supported (p = .473).

Hypothesis 25 states that the number of medications used will be negatively related to outcome expectations. This hypothesis was supported (beta = -.2679; standard error = .016; t = -2.147; p = .036). The only other predictor of the number of medications used was the number of painful sites (p = .001).

Hypothesis 26 states that self-efficacy will be negatively related to the number of appointments with physicians for treatment of fibromyalgia symptoms during the past year. This hypothesis was not supported (p = .60).

Hypothesis 27 states that outcome expectations will be negatively related to the number of appointments with physicians for treatment of fibromyalgia symptoms during the past year. This hypothesis was not supported (p = .56).

Hypotheses Related to Work

Hypothesis 28 states that self-efficacy expectations will be negatively related to the number of days taken off from work or daily activities during the past month and during the past year. Self-efficacy was not a significant predictor of days taken off (p = .87 for days off during the past month and .70 for days off during the past year).

Hypothesis 29 states that outcome expectations will be negatively related to the number of days taken off from work or daily activities during the past month and during the past year. This hypothesis was not supported (p = .42 for the past month and .78 for the past year).

Hypothesis 30 states that self-efficacy expectations will be positively related to the number of hours worked for pay per week. This hypothesis was not supported (p = .55).

Hypothesis 31 states that outcome expectations will be positively related to the number of hours worked for pay per week. This hypothesis was not supported (p = .42).

Hypotheses related to exercise

Hypothesis 32 states that the amount of time spent exercising during the past week will be positively related to exercise self-efficacy scores. This hypothesis was not supported (p =- .12).

Hypothesis 33 states that the number of exercises attempted during the past week will be positively related to exercise self-efficacy scores. This hypothesis was not supported (p = .40). Self-efficacy expectations was a significant predictor of the number of types of exercises attempted (p = .027).

Other Findings

Although self-efficacy expectations and outcome expectations were related to the reported use of active strategies, the variables were not shown to be significant predictors of the number of hours worked for pay per week. None of the covariates were shown to be significant predictors of hours worked. In order to determine which variables were predictive of employment, a logistic regression was performed using many of the original outcome variables and variables used to determine the divergent and convergent validity as independent (predictor) variables and work (versus no work for pay) as the dichotomous dependent variable. Those variables that were most predictive of work were arthritis functioning (a subscale on the Arthritis Self-Efficacy Scale), depression, family support, internal locus of control, self-esteem, total Sickness Impact Profile scores and age. Achievement Striving (a subscale of the Conscientiousness scale of NEO-PI) approached significance (p = .06). Table 9 shows the means of the above variables for those working and those not working.

Table 9

<u>Variables on which Employed and Unemployed Scores were Significantly Different</u>

	Employed (n = 38)	Unemployed (n = 32)
Age	42.51	47.83
Arthritis Functioning	72.97	61.91
Depression	4.84	8.11
Family Support	29.11	32.74
Internal Locus of Control	25.16	22.83
Self-Esteem	1.78	2.74
Sickness Impact	189.92	304.74
Achievement Striving	20.57	18.40

The Arthritis Functioning Scale of the Arthritis Self-Efficacy Scale was the best predictor of whether a person was working for pay. This section of the Arthritis Self-

Efficacy Scale measures persons' belief in their ability to perform tasks that require mobility. Those whose self-efficacy was lower in this area were less likely to be working. Those who were employed, as a group, were younger than those who were not. Age was not significantly related to arthritis functioning scores (r = -.2). The fact that the working group was younger may be partially due to the fact that the this study included some subjects who were beyond the typical age of retirement and might not be expected to be working even without fibromyalgia. Five of the six subjects who were 65 years old or older were in the non-working group.

Sickness Impact Profile scores also were predictive of work status. Those with higher total scores were less likely to be working. It makes logical sense that those who report experiencing symptoms as having a greater impact on their lives would be less likely to be working. Factors that predicted Sickness Impact scores include number of painful sites (beta = .2632; standard error = .08; t = 2.942; p = .005), family support (beta = -.2908; standard error = .20; t = -2.79; p = .007), and self-efficacy expectations (beta = -.2288; standard error = 1.06; t = -2.164; p = .34). The greater the perceived family support, the lower the sickness impact.

Self-esteem was also a significant predictor of work status. Those who were working showed greater self-esteem (lower scores on the Rosenberg Self-Esteem Scale) than did non-working subjects. The exact nature of the relationship between work status and self-esteem could not be determined by the data collected for this study. Based on this researcher's clinical experience, it is not uncommon for fibromyalgia patients to state that their self-esteem is much lower than it had been prior to the onset of their symptoms. A common reason given for this lowered self-esteem is that they cannot do the things they used to be able to do. It may be useful to ask subjects whether they believe their self-esteem has changed since the onset of symptoms and ask them to report what they perceive as being the reason for the change when further study is done in this area. If self-esteem is generally lowered as a result of a perception of being less able to do things they used to be able to do, this could provide a partial explanation for the relationship between self-efficacy and self-esteem. In the present study, the two were found to be moderately correlated, but not so strongly correlated that it could be assumed that they are measuring the same thing.

Although self-efficacy expectations did not quite meet the criteria for significance in its ability to predict work status ($p = .058$), self-efficacy scores were predictive of scores on some of the measures that were significant predictors of work status. For example, self-efficacy was a significant predictor of depression, internal locus of control, the scores on the arthritis functioning scale, scores on the achievement striving subscale of the NEO-PI., and self-esteem.

Chapter 5

Discussion

The purpose of this study was to develop a reliable and valid instrument designed to measure fibromyalgia patients' self-efficacy and outcome expectations regarding the use of pain, stress and sleep management techniques. Of particular interest was whether the current level of self-efficacy and outcome expectations are predictive of current level of functioning and psychological distress.

Content Validity

The second group of raters were in strong agreement regarding most items; however, there was less than 100% agreement on outcome expectation items that were negatively stated (e.g. Doing daily work at a comfortable pace will not help me reduce my fibromyalgia symptoms) Eighty-six percent of the second group of raters were in agreement that these negatively stated items were measuring outcome expectations. This met the 85% criterion set for retention, therefore, the items were retained. It is not clear whether raters rejected negative items more frequently just because they stand out as being different from the others or whether a real disagreement exists (i.e. can a belief that a result will not occur constitute an outcome expectation?). Further investigation addressing this question is warranted.

Prediction of Current Levels of Anxiety, Depression and Somatization

A major goal of this study was to determine whether a measure of self-efficacy and outcome expectations may serve to explain some of the variance in anxiety and depression that is often found in psychological studies of fibromyalgia patients. If the current level of depression and anxiety is related to the current level of self-efficacy, then a measure of self-efficacy may be useful in identifying those fibromyalgia patients who are at risk for becoming depressed or anxious.

As anticipated, self-efficacy was a strong predictor of anxiety. This finding is consistent with Bandura's (1988) suggestion that those who believe they cannot manage potential threats or perform behaviors (pain, stress and sleep management techniques) that could produce a desired outcome, experience high levels of anxiety. Outcome expectations was also a predictor of anxiety when entered into the model alone. However, when entered along with self-efficacy expectations, outcome expectations no longer provided significant, unique explanation of the variance in anxiety. Self-efficacy expectations, as hypothesized, was a stronger predictor of anxiety than was outcome expectations. These facts provide some evidence for the possible interrelatedness of self-efficacy and outcome expectations. These findings are similar to those of Council et. al. (1988). Their path analysis indictated that self-efficacy expectations may mediate the relationship between response expectancies, which is very similar to outcome expectations, and functioning. They suggest that the patient's belief about the outcome of a behavior on pain may influence their beliefs about their ability to engage in that behavior, which then influences the actual initiation of the behavior. The results of the present study, along with those of the Council, et al. (1988) study support the need for further studies looking into the role outcome expectations, or response expectancies, play in explaining behavior.

The only other variable that was significantly related to anxiety was age (beta = -.2067; standard error = .008; t = -2.112, p = .05). The younger the subject, the greater the anxiety. Self-efficacy scores and age were not strongly correlated (r = .08), therefore, it cannot be concluded that younger subjects had lower self-efficacy and, as a result, were more anxious. It may be that those subjects who were younger were feeling more threatened by the symptoms than were older subjects. Younger subjects would, potentially, have more years of work ahead of them. In addition, younger subjects may experience more loss as a result of the symptoms if they were more active than older subjects. Younger subjects may have had fewer experiences with pain and fatigue than older subjects and may be more likely to view their symptoms as representing something seriously wrong with them. In addition, one of the difficult issues fibromyalgia patients face is the fact that they tend to look healthy. As a result of this, expectations placed on them by others may exceed what the patients believe they can accomplish. Younger patients may feel this pressure more than older ones since they may look more capable than older patients. Younger patients may also be more likely than older subjects to be parents of young children. The pressures of taking care of young children could add to their anxiety. In this sample, age was a significant predictor of the number of children for whom the subjects were currently responsible ($r = -.25$). The younger the subject, the greater the number of children for which they are responsible. In future studies it may be useful to ask subjects to rate how threatened they feel as a result of their symptoms and list the factors they perceive as contributing to their feeling threatened.

Both self-efficacy and outcome expectations scores were predicted to correlate with scores on depression. Both variables provided a significant, unique, explanation of the variance in depression when scores for each were placed in the model separately, however, when placed in the model together, only self-efficacy expectations was a significant predictor of depression. This finding is not consistent with Bandura's suggestion that anxiety results from perceived inefficacy, while depression occurs when people believe that a valued outcome is not likely to be attained. Based on the learned helplessness model for explaining depression, however, the present findings make sense. Those who feel less able to use the techniques of managing pain, stress and sleep, may feel helpless to take control of their symptoms (an outcome) and, as a result, become depressed. They are likely to feel just as helpless regardless of whether or not they believe applying those techniques will result in a desired outcome. If they believe themselves incapable of performing the techniques, the outcome of using those techniques may not be very relevant.

Although self-efficacy and outcome expectations showed a significant, negative relationship to depression, it was family support that was the strongest predictor of depression. The importance of family support is discussed below, along with its relationship to work.

It was predicted that both self-efficacy expectations and outcome expectations would predict somatization scores. As with depression, outcome expectation scores were predictive of somatization scores when placed in the model as the only independent variable. When self-efficacy expectations were also placed in the model, OE scores no longer provided significant, unique explanation of the variance in somatization scores. Somatization was more strongly related to perceived ability to perform skills related to managing fibromyalgia symptoms than it was to the perceived outcome of employing those skills. The stronger the belief that they can perform the skills, the lower the somatization, depression and anxiety scores. The only other significant predictor of somatization scores was pain intensity. Somatization and anxiety were moderately related ($r = .68$); however, anxiety was not very strongly related to pain intensity (.20). It appears that perceived ability to take some form of action to manage symptoms (self-efficacy expectations) was more strongly associated with anxiety than was actual perceived pain intensity.

The Brief Symptom Inventory scores on depression, anxiety and somatization were compared to norms for adult non-psychiatric patients. Fifty percent (36) of the subjects in the study scored in the normal range for depression, while the other fifty percent were above average on depression. This is consistent with the findings in other studies which suggest that not all fibromyalgia patients are depressed. Fifty-five percent (40) of the 72 subjects scored within the normal range on the anxiety scale of the BSI, indicating that at least half of the subjects did not have a serious problem with anxiety during the 7 days prior to responding to the items. Only 7 (9.7%) of the subjects scored within the normal range on the somatization scale. Thirty-two (44.4%) responded to item 33 (numbness or tingling in parts of your body) and 38 (52.8%) responded to item 37 (feeling weak in parts of your body) with a 3 or 4. These two items represent very common symptoms reported by fibromyalgia patients. Because of this, the scale may be somewhat biased toward fibromyalgia patients scoring above the normal range. The strongest predictors of somatization scores were self-efficacy expectations and pain intensity. It should be noted that the fibromyalgia subjects, as a group, had a mean that was not significantly different from the mean of the non-patient norm group used in developing the BSI.

Discussion of Results related to Coping

Both self-efficacy expectations and outcome expectations were predictive of reported use of active forms of coping strategies, with SE being the stronger of the two predictors. In addition, those who had higher scores on exercise self-efficacy were also likely to report the use of active styles of coping. High self-efficacy scores were also predictive of low scores on the passive scale of the Pain Management Inventory. SE and OE were also predictive of specific strategies for coping, including ignoring (SE significant at .05; OE significant at .008), reinterpretation (OE $p = .01$) and coping self-statements (SE $p = .05$; OE $p = .04$). There was also a significant negative relationship between the reported use of catastrophizing and self-efficacy expectations ($p = .008$). These findings indicate that scores on the SE and OE sections of the FSEM could be useful in predicting which fibromyalgia patients are most likely to use active or passive styles of coping. Those who are not using active styles may be failing to do so because they lack self-efficacy regarding their ability to employ pain and stress management techniques. The next step in the research involving this measurement would be to repeat the concurrent validity steps in the present research on a larger sample to determine cut off points below which patients are at high risk for taking a passive approach to coping and/or using catastrophizing and failing to use active strategies.

The results of this study regarding the relationship between SE, the reported use of active versus passive coping strategies and depression seem to support Bandura's theory. Those with high self-efficacy regarding their ability to use active techniques for coping with the pain and other symptoms associated with fibromyalgia were more likely to report actually using active strategies for coping with pain and were less likely to be depressed. Those with low self-efficacy were more likely to report the use of passive strategies for coping and were more depressed. The correlation between reported use of passive strategies and depression was significant ($r = .39$; $p = .001$). Weickgenart, Slater, Patterson, Atkinson, Grant and Garfin (1993) found that not all chronic low back pain patients who were depressed were more likely to use passive strategies for coping with pain. Altmaier, Russell, Kao, Lehmann and Weinstein (1993) found that a treatment designed to increase low back pain patients' self-efficacy regarding their ability to perform 20 activities resulted in increases in those active behaviors following treatment and a reduction in pain. Kleinke has provided evidence for a relationship between self-efficacy and actual use of active coping strategies as a function of depression. He reported that those who used a self-management coping style were less likely to be depressed than those who respond to pain an a helpless manner. In order to clarify the relationship between self-efficacy, use of active versus passive coping strategies and depression, it will be important for studies to measure changes in self-efficacy, behavioral changes and emotional changes. Studies should test whether people who have some training in coping strategies may develop greater self-efficacy regarding their ability to use those strategies. This may result in their using those strategies, which could, in turn, lead to lower levels of helplessness and depression along with a reduction in reported pain. The results of the present study showed support for a relationship between these variables, but conclusions regarding cause cannot be made.

Some of the findings of this study are consistent with those of Jensen, Turner and Romano (1991) who found that self-efficacy expectations were predictive of the reported use of coping strategies. Those with higher self-efficacy regarding their ability to perform the strategies reported a higher use of those strategies. In the present study, self-efficacy expectations regarding the ability to perform specific techniques were positively related to the reported use of some active strategies (ignoring, and diverting attention) and negatively related to the reported use of catastrophizing. Unlike Jensen, Turner and Romano, however, the present study also found that outcome expectations regarding the use of pain, stress and sleep management techniques were predictive of reported use of ignoring, diverting attention and coping self-statements.

Family Support

Recent studies of family support in chronic pain populations indicate that the relationship between family support and disability from pain is somewhat complex. There is some evidence that some types of supportive behaviors may interfere with progress in pain patients' efforts toward rehabilitation. Researchers (Fordyce, 1973) have emphasized the important role spouses and significant others play in reinforcing their partner's pain behaviors. In their attempts to support their partner who is in pain, spouses may become discriminate stimuli for pain behaviors. The present findings support Fordyce's (1973) emphasis on the important role family members can play in enhancing or interfering with pain patients' psychosocial adjustment to pain. Recent studies suggest that whether or not support results in reinforcement of pain behaviors may depend on gender and/or marital satisfaction. Findings from Turk, Kerns and Rosenberg (1992) suggest the possibility that when spouses provide attention to pain behaviors, pain intensity, disability, and frequency of pain behaviors will increase. When spouses punish pain behaviors, there is an increase in depression in pain patients.

In the present study, those who reported experiencing the greatest social support were more likely to be working and were less likely to be depressed. As Fordyce (1973) points out, family members may serve both as reinforcers for well-behaviors and pain behaviors. The social support measurement used in this study looks at general support, but does not measure the type of responses the spouses make toward the patient's pain behaviors. The present study also did not look at marital satisfaction. Future studies will need to use measurements that look more closely at the type of support provided by significant others and their responses to the subject's pain behaviors. Another important finding for this sample was, the greater the perceived family support, the lower the sickness impact. This, again, indicates that, for subjects in this study, social support seemed to be encouraging higher levels of functioning rather than reinforcing a more helpless response to illness.

Limitations

This study has several important limitations. (1) The study was based on a small number of subjects. The size of this group was large enough to perform a pilot study for the purpose of determining whether further research in this area is warranted, and for the purpose of looking at reliability and validity, but it places limitations on the extent to which the results can be generalized. All subjects were from Michigan in order to control for climate. It is not certain whether similar results would be found in other geographical areas. (2) The findings were based on responses by volunteers rather than on a random sample. The fact that subjects were asked to provide a great deal of information and invest a lot of time may have resulted in attaining information from a group that is highly motivated. There is no way of knowing whether this group is representative of fibromyalgia patients in general. (3) The measurements in this study were all based on self-report; there were no objective measurements of disability and there was no way of determining whether subjects reported use of coping techniques actually reflected their behavior. (4) Although general family support was taken into consideration in this study, it would have been useful to also look more specifically at the responses of family members toward the subjects' pain behaviors. (5) No causal attributions can be made as a result of this study, it can only be concluded that scores on this self-efficacy instrument are related to some measures of adjustment.

Future Research

The results of this study, along with the findings of Buckelew, Parker, Keefe, Deuser, Crews, Conway, Kay, and Hewett (1994) that fibromyalgia patients' self-efficacy for managing pain is related to the frequency of pain behaviors, indicates that further study in this area is warranted. In particular, further research needs to be done on the FSEM. It will be important to look at whether the results of the present study are repeated across other samples, including samples taken from a variety of climates. It will be important to gather data from a very large sample to develop norms for the FSEM so that there will be a way of determining how an individual patient compares with other fibromyalgia patients. Factor analysis of the FSEM may also be useful in determining whether specific factors emerge that are most predictive of various measures of functioning and adjustment.

It appears that the FSEM may be a useful tool for identifying patients who are potentially at risk for being depressed or anxious and/or at risk for taking a passive approach toward coping. It will be important to determine whether the Arthritis Self-Efficacy Scale, which is shorter and uses more general statements would be equally useful for this purpose as the longer FSEM, which looks at more specific pain, stress and sleep management techniques. Studies need to be done to determine whether the FSEM may also be useful as an outcome measurement for pain clinic programs that treat fibromyalgia patients. It may also be useful to look at whether a 10-point scale would be more sensitive to changes over a treatment period than would the current 5-point scale. Work also needs to be done in determining whether increases in self-efficacy result in corresponding increases in functioning and decreases in psychological distress.

The results of the present study suggest the possibility that outcome expectations are less significant in predicting adjustment and reported use of active coping strategies in comparison to self-efficacy expectations. More research needs to be done in identifying the relationship between outcome expectations and the frequency with which patients actually use the techniques addressed in the FSEM.

The results of the content validation procedure raises the question of whether or not a belief that performing a behavior will not lead to a specific result constitutes an outcome expectation. It would be useful to consult with Dr. Bandura and/or have others who have developed self-efficacy measurements provide feedback on whether negatively stated items are appropriate to use in examining outcome expectations.

Given that exercise self-efficacy scores did not predict reported exercise behavior in this study, it will be important to do further research looking into factors that are predictive of actual exercise behavior. This is especially important given the growing evidence that exercise is a very important component in the treatment of fibromyalgia.

The finding that family support was a strong predictor of depression and work status, suggests that further research needs to be done for the purpose of determining the type of family support that is most beneficial. It will be especially important to look at how family members respond to the patient's pain behaviors.

The only significant predictors of the number of appointments were age ($p = .004$) and sleep quality ($p = .033$). Younger subjects and those reporting better sleep quality reported having more appointments with physicians. One possible explanation for this finding could be that younger subjects may have been more likely to be taking medications for sleep. This would account for better sleep quality and more trips to their physicians who would need to monitor the effects of those medications. It will be important to look into that possibility. In addition, physician visits may benefit patients by providing motivation to follow through with behavioral aspects of treatment. This was not examined in the present study, but could be an important factor to be looked at in future studies. It may be that some patients may stick with treatment plans, more rigidly if they know they will be asked about their efforts during their office visits.

Conclusion

The results of this study indicate that the FSEM shows good internal consistency, split-half reliability and concurrent validity for depression, anxiety, type of coping techniques used. It also provides evidence that the level of fibromyalgia patients' self-efficacy regarding their ability to perform pain, stress and sleep management techniques is related to their psychological adjustment and their use of active versus passive coping strategies in response to the disorder. The results indicate that outcome expectation scores predict the reported use of some specific coping strategies; however, they do not predict the presence of depression, anxiety, or somatization as well as self-efficacy expectations. There appear to be additional factors beyond self-efficacy that predict actual time spent exercising, therefore, more research needs to be done for the purpose of identifying other predictors of exercise. Family support emerged as an important predictor of depression and work status.

The findings of this study have important implications for counseling psychology. The results suggest the possibility that efforts to increase patients' self-efficacy through teaching pain, stress and sleep management techniques may result in a reduction in psychological distress and increases in functioning. Given support group members' frequent complaints that they had been told they were just going have to learn to live with their symptoms, without being told how to go about doing that, it appears that there is a need to educate patients about fibromyalgia and the management of its symptoms. Counseling psychology has its foundation in education, therefore, a major part of the role of a counseling psychologist is to educate clients. The emphasis counseling psychologists place on education makes them well suited as potential allies in the treatment of fibromyalgia patients. When physicians do not have the time to spend with their patients in educating them on fibromyalgia and teaching them cognitive and behavioral techniques for coping, a referral to a counseling psychologist who can teach pain, stress and sleep management techniques may be a very valuable referral source.

APPENDIX A

FIBROMYALGIA STUDY CONSENT FORM

The purpose of this study is to find out what fibromyalgia patients believe they can do to help themselves reduce their symptoms and adjust to having fibromyalgia syndrome.

The following measurements will take between 90 and 120 minutes to complete. Your responses to the questions will be recorded using your subject number rather than your name so that your responses will remain confidential.

If you have any questions or concerns regarding your participation in the study, please contact Mary Stelma at (517) 394-2508 or (616) 781-9203.

Your participation in this study is completely voluntary. If at any time you wish to withdraw from the study, you can do so by contacting me at the above telephone number.

After you have read the following, please sign your name below:

I have been informed of the purpose of this study. I understand that my participation in this study is voluntary and that I am able to withdraw from the study at any time. I also understand that reports of any of the results of this study will not include my name.

____

Signature

____

Date

MICHIGAN STATE
UNIVERSITY

July 26, 1993

TO: Ms. Mary Stelma
332 1/2 South Madison
Marshall, MI 49068

RE: IRB #: 93-339
TITLE: SELF-EFFICACY AND FIBROMYALGIA SYNDROME: A POSSIBLE SCREENING DEVICE FOR REFERRING PATIENTS TO PAIN CLINICS
REVISION REQUESTED: N/A
CATEGORY: 2-I
APPROVAL DATE: 07/21/1993

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project including any revision listed above.

Renewal: **UCRIHS approval is valid for one calendar year, beginning with the approval date shown above.** Investigators planning to continue a project beyond one year must use the enclosed form to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

Revisions: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the enclosed form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable. the year, please outline the proposed revisions in a letter to the Committee.

Problems/ Changes: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

OFFICE OF
**RESEARCH
AND
GRADUATE
STUDIES**

**University Committee on
Research Involving
Human Subjects
(UCRIHS)**

Michigan State University
25 Administration Building
East Lansing, Michigan
48824-1046
517/355-2180
FAX 517/336-1171

If we can be of any future help, please do not hesitate to contact us at (517) 355-2180 or FAX (517) 336-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:pjm

cc: Dr. Nancy Crewe

FIBROMYALGIA QUESTIONNAIRE

Subject #

Today's Date ________________________

Please provide the following background information about yourself:

(1) Gender (circle): Female Male

(2) Age _________

(3) Marital Status (Please circle): Single Married Divorced Live-in partner

Widowed

(4) How man children are currently living in your home? _________

Are you primarily responsible for those children Yes _____ No ______

(5) What is the highest level of education you have attained?

(6) Please indicate your ethnic background:

African American ________ Caucasian ________ Hispanic ______

Asian-American _______ Other _______ If other, please indicate what your background is on the following line ____________________

(7) When did you first notice your fibromyalgia symptoms?

Month ______ Year ______

(8) When were you first diagnosed as having fibromyalgia?

(9) Are you currently working ? Yes ________ No _________

Is this work for pay? Yes ________ No ________

What kind of work are you doing? ______________________

____

How many hours a week do you work? __________

(10) Have you had to give up working or change the type of work you do as a result of your fibromyalgia symptoms?

Yes _________ No___________

If yes, what kind of work were you doing before you made your change or stopped working?

____

____

(11) How many days have you had to take off from work or daily activities during the past month due to fibromyalgia symptoms?

(12) How many days have you had to take off from work or daily activities during the past year due to fibromyalgia symptoms?

(13) How many appointments have you had with your doctor(s) during the past year?

(14) Have you ever received help from a psychologist or pain clinic to help you learn pain management techniques?

If yes, when did you receive that help?

(15) Do you use any relaxation techniques such as deep relaxation (gradually relaxing all of your muscles from your head to your toes), meditation, or closing your eyes and pretending you are in a peaceful place?

Yes ________ No ________

If yes, how many minutes a week do you spend using relaxation techniques?

(16) Do you currently schedule your time carefully so that yo do not feel pressured by time or have to hurry to get things done?

Yes ________ No ________

(17) How many times a week do you take part in fun activities?

(18) Do you go to bed and get up at about the same time everyday?

Yes ________ No ________

(19) What kinds of exercise have participated in during the past two week (please indicate how may times you participated in each exercise and for how long each time?

Type of Exercise	Number of Times	Amount of time spent in minutes
____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________

(20) What medications are you currently taking for fibromyalgia symtpoms?

Medication	How often do you take the medication
________________	______________________________
________________	______________________________
________________	______________________________
________________	______________________________
________________	______________________________
________________	______________________________

(21) Are you currently being treated for other medical conditions?

Yes _______ No _________

If yes, what are those conditions?

(22) Do you have other medical conditions that require constant management such as diabetes, allergies, asthma, etc.?

Yes _________ No ________

If yes, what are those conditions?

(23) How would you rate the quality of your sleep during the past week?

Place a mark on the line above the number that best tell how well you have slept. You may place your mark between two numbers.

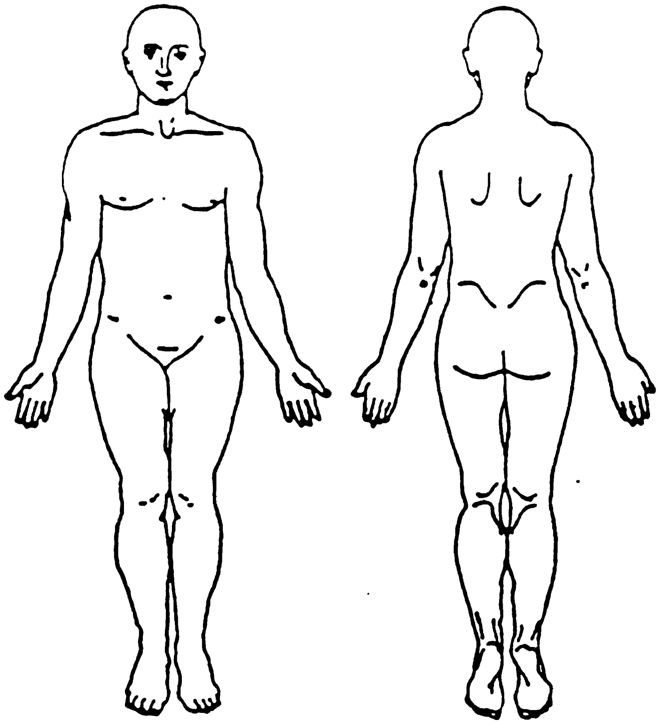
____

1 2 3 4 5 6 7 8 9 10

Always wake up feeling exhausted	Always wake up feeling rested and ready to get out of bed

Where is Your Pain?

Please mark with an "x" on the drawings below, the areas where you feel pain



Please place a mark on the line below that tells how intense or bad your pain is right now

No Pain

Worst Possible Pain

FIBROMYALGIA SELF-EFFICACY MEASUREMENT

Circle the number on the right that matches your level of confidence in your ability to perform the task or skill below.

0	1	2	3	4
No Confidence	Little Confidence	Some Confidence	A lot of Confidence	Complete Confidence

How much confidence do you have in your ability to perform the following skills or tasks:

1. I am able to close my eyes and gradually relax all of my muscles from the top of my head to my toes (deep relaxation) when I am feeling tense or in pain	0	1	2	3	4
2. I am able to close my eyes and imagine that I am lying on a warm beach and feel the hot sand warming and relaxing my muscles when I am in pain feeling tense.	0	1	2	3	4
3. I am able to take time to use physical stimulation such as massage, a warm bath or shower, or applying a heating pad when I am experiencing pain.	0	1	2	3	4
4. I am able to use physical cues such as pain level, stiffness, and/or muscle tension to prevent myself from over-doing physical activity.	0	1	2	3	4
5. I am able to keep myself from doing behaviors such as rubbing, massaging, and shifting, positions, that draw attention to my pain.	0	1	2	3	4
6. I am able to ignore most pain by turning my attention to activities outside of my body.	0	1	2	3	4
7. I am able to pace my daily acitivities so that I do not become tense while completing those activities.	0	1	2	3	4

0	1	2	3	4
No Confidence	Little Confidence	Some Confidence	A lot of Confidence	Complete Confidence

8. I am able to recognize the physical signs (rapid breathing, muscle tension, etc.) that I am experiencing stress. 0 1 2 3 4

9. When I become aware of situations that make me tense or anxious, I am able to find ways to stay away from or change those situatons. 0 1 2 3 4

10. I am able to recognize thoughts (statements I make to myself) that make me feel upset or tense. 0 1 2 3 4

11. When I am thinking in ways that make me feel tense or anxious, I am able to change those thoughts to thoughts that make me feel less tense or anxious. 0 1 2 3 4

12. I am able to recognize statements I make to myself (thoughts) that make me notice my pain and fatigue. 0 1 2 3 4

13. When I find myself making statements to myself or thinking in ways that make my pain and fatigue worse, I am able to change those statements or thoughts to thoughts and statements that make the pain and fatigue easier to handle. 0 1 2 3 4

14. When I am short-tempered or irritable, I am able to recognize those behaviors as signs that I am experiencing stress. 0 1 2 3 4

15. When I feel sad, angry, or frustrated, I am able to recognize those feelings as signs that I am experiencing stress. 0 1 2 3 4

16. I am able to use deep relaxation to reduce tension in my muscles. 0 1 2 3 4

0	1	2	3	4
No Confidence	Little Confidence	Some Confidence	A lot of Confidence	Complete Confidence

17. I am able to remember to periodically chech my muscles to make sure they are relaxed. 0 1 2 3 4

18. I am able to close my eyes and focus only on my breathing, while shutting off all or most of my thoughts. 0 1 2 3 4

19. I am able to identify (know what to call) the feelings I am experiencing (I know the difference between feeling sad, angry, frustrated, or annoyed, etc.) 0 1 2 3 4

20. I am able to express my feelings in positive ways even when I am in pain or feeling very tired. 0 1 2 3 4

21. I am able to say "no" to others when they ask me to do things I know will make me feel worse. 0 1 2 3 4

22. I am able to ask for help from others before my pain and/or fatigue become severe from trying to do too much by myself. 0 1 2 3 4

23. I am able to pace myself when completing work assignments or chores at home so that I do not become tense due to time pressure. 0 1 2 3 4

24. I am able to manage my time well so that I have time to complete all of my work. 0 1 2 3 4

25. I am able to have fun with others even when I am in pain or feeling very tired. 0 1 2 3 4

26. When I am having trouble falling asleep, I am able to focus my thoughts on pleasant things. 0 1 2 3 4

27. When I am having trouble falling asleep, I am able to get out of bed and find something else to do. 0 1 2 3 4

0	1	2	3	4
No Confidence	Very Little Confidence	Some Confidence	A Lot of Confidence	Complete Confidence

28. I am able to keep a regular (routine) sleep schedule even on my days off from work and/or on weekends.	0	1	2	3	4
29. When I wake up feeling exhausted or very tired, I am able to talk to myself in a way that helps me get out of bed in the morning.	0	1	2	3	4
30. I am able to perform at least one type of aerobice exercise for 20 minutes or more without stopping.	0	1	2	3	4

In this section, please indicate how much you agree (or disagree) with each of the following statements using the scale below:

Completely Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Completely Agree
0	1	2	3	4

1. Thinking positive thoughts will help me reduce my pain and fatigue.	0	1	2	3	4
2. Talking about things other than pain and fatigue will usually help me feel better.	0	1	2	3	4
3. Doing aerobic exercise will help me control my fibromyalgia symptoms.	0	1	2	3	4
4. Getting help from others will help me prevent flare ups of my fibromyalgia symptoms.	0	1	2	3	4
5. Doing daily work at a comfortable pace will not help me reduce my fibromyalgia symptoms.	0	1	2	3	4
6. Meditating (letting my mind become quiet) will help me feel less tense and worried about my fibromyalgia symptoms.	0	1	2	3	4
7. Managing time so that I do not feel rushed will not reduce my fibromyalgia symptoms.	0	1	2	3	4
8. Keeping a regular (routine) sleep schedule will help me feel less tired during the day.	0	1	2	3	4
9. Expressing my feelings in appropriate ways will help reduce my fibromyalgia symptoms.	0	1	2	3	4

Completely Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Completely Agree
0	1	2	3	4

10. Taking a hot bath or shower will give me temporary relief from fibromyalgia pain. 0 1 2 3 4

11. Paying attention to, or focusing on things outside of my body will make me less aware of my pain and fatigue. 0 1 2 3 4

12. Managing or reducing stress will help me reduce my fibromyalgia symptoms. 0 1 2 3 4

13. Having fun with friends will help me keep my mind off of my pain and/or fatigue. 0 1 2 3 4

14. Relaxing my muscles will <u>not</u> reduce pain and fatigue that is associated with fibromyalgia. 0 1 2 3 4

15. Imagining that I am in a peaceful place will hel me reduce my pain and fatigue. 0 1 2 3 4

16. Laughing will help give me more energy and it will relieve my pain. 0 1 2 3 4

17. Listening to music I enjoy will help me reduce my fibromyalgia symptoms. 0 1 2 3 4

18. Thinking about things I am looking forward to doing will make me notice my pain and fatigue less. 0 1 2 3 4

19. I will avoid increasing my pain and fatigue when I say "no" to people who ask me to do things I know will make me feel worse. 0 1 2 3 4

20. It will be easier for me to fall asleep when I think about pleasant things. 0 1 2 3 4

Completely Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Completely Agree
0	1	2	3	4

21. I will feel less tense if I get out of bed and find something else to do when I am having trouble falling asleep.	0	1	2	3	4
22. Doing stretching exercises will give me some relief from my pain.	0	1	2	3	4
23. Making myself exercise even after a long, tiring day at work will reduce my pain.	0	1	2	3	4
24. Exercising when I am feeling sad or depressed will help me reduce those symptoms.	0	1	2	3	4

The Brief Symptom Inventory, which was to be placed on pages 130-131 could not be adequately reproduced. Copies of the BSI can be obtained through National Computer Systems, Inc., Minneapolis, MN.

The Brief Symptom Inventory, which was to be placed on pages 130-131 could not be adequately reproduced. Copies of the BSI can be obtained through National Computer Systems, Inc., Minneapolis, MN.

COPING STRATEGIES QUESTIONNAIRE

Individuals who experience pain have developed a number of ways to cope, or deal, with their pain. These include saying things to themselves when they experience pain, or engagning in different activities. Below are a list of things that individuals have reported doing when they feel pain. For each activity, I want you to indicate, suing the chart below, how much you engage in that activity when you feel pain, where a 0 indicates you never do that when you are experincing pain, a 3 indictes you sometimes do that when you are experiencing pain, and a 6 indicates you always do it when you are experiencing pain. Remember, you can use any point along the scale.

0	1	2	3	4	5	6
Never do that			Sometimes do that			Always do that

When I feel pain ...

_____ 1. I try to feel distant from the pain, almost as if the pain was in somebody else's body.

_____ 2. I leave the house and do something, such as going to the movies or shopping.

_____ 3. I try to think of something pleasant.

_____ 4. I don't think of it as pain but rather as a dull or warm feeling.

_____ 5. It's terrible and I feel it's never going to get any better.

_____ 6. I tell myself to be brave and carry on despite the pain

_____ 7. I read.

_____ 8. I tell myself that I can overcome the pain.

_____ 9. I take my medication.

0	1	2	3	4	5	6
Never do that			Sometimes do that			Always do that

_____ 10. I count numbers in my head or run a song through my mind.

_____ 11. I just hink of it as some other sensation, such as numbness.

_____ 12. It's awful and I feel that it overwhelms me.

_____ 13. I play mental games with myself to keep my mind off the pain.

_____ 14. I feel my life isn't worth living.

_____ 15. I know someday someone will be here to help me and it will go away for a while.

_____ 16. I walk a lot.

_____ 17. I pray to God it won't last long.

_____ 18. I try not to think of it as my body, but rather as something separate from me.

_____ 19. I relax.

_____ 20. I don't think about the pain.

_____ 21. I try to think years ahead, what everything will be like after I've gotten rid of the pain.

_____ 22. I tell myself it doesn't hurt.

_____ 23. I tell myself I can't let the pain stand in the way of what I have to do.

_____ 24. I don't pay any attention to the pain.

_____ 25. I have faith in doctors that someday there will be a cure for my pain.

_____ 26. No matter how bad it gets, I know I can handle it.

_____ 27. I pretend it's not there.

0	1	2	3	4	5	6
Never do that			Sometimes do that			Always do that

_____ 28. I worry all the time about whether it will end.

_____ 29. I lie down.

_____ 30. I replay in my mind pleasant experiences in the past.

_____ 31. I think of people I enjoy doing things with.

_____ 32. I pray for the pain to stop.

_____ 33. I take a shower or a bath.

_____ 34. I imagine that the pain is outside of my body.

_____ 35. I just go on as if nothing happened.

_____ 36. I see it as a challenge and don't let it bother me.

_____ 37. Although it hurts, I just keep on going.

_____ 38. I feel I can't stand it anymore.

_____ 39. I try to be around other people.

_____ 40. I ignore it.

_____ 41. I rely on my faith in God.

_____ 42. I feel like I can't go on.

_____ 43. I think of things I enjoy doing.

_____ 44. I do anything to get my mind off the pain.

_____ 45. I do something I enjoy, such as watching TV or listening to music.

_____ 46. I pretend it's not a part of me.

_____ 47. I do something active, like household chores or projects.

_____ 48. I use a heating pad.

Based on all the things you do to cope, or deal, with your pain, on an average day, how much control do you feel you have over it? Please circle the appropriate number. Remember, you can circle any number along the scale.

0	1	2	3	4	5	6
No Control			Some Control			Complete Control

Based on all the things you do to cope, or deal, with your pain, on an average day, how much are you able to decrease it? Please circle the appropriate number. Remember, you can circle any number along the scale.

0	1	2	3	4	5	6
Can't Decrease it at all			Can Decrease it somewhat			Can Decrease it completely

MULTIDIMENSIONAL HEALTH LOCUS OF CONTROL

FORM B

This is a questionnaire designed to determine the way in which different people view certain important health-related issues. Each item is a belief statement with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you disagree or agree with the statement. The more strongly you agree with a statement, then the higher will be the number you circle. The more strongly you disagree with a statement then the lower will be the number you circle. Please make sure that you answer every item and that you circle only one number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

Please answer these items carefully, but do not spend too much time on any one item. As much as you can, try to respond to each item independently. When making your choice, do not be influenced by your previous choices. It is important that you respond according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. If I become sick, I have the power to make myself well again.	1	2	3	4	5	6
2. Often I feel that no matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3. If I see an excellent doctor regularly, I am less likely to have health problems.	1	2	3	4	5	6
4. It seems that my health is greatly influenced by accidental happenings.	1	2	3	4	5	6
5. I can only maintain my health by consulting health professionals	1	2	3	4	5	6
6. I am directly responsibel for my health.	1	2	3	4	5	6
7. Other people play a big part in whether I stay healthy or become sick.	1	2	3	4	5	6
8. Whatever goes wrong with my health is my own fault.	1	2	3	4	5	6
9. When I am sick, I just have to let nature run its course.	1	2	3	4	5	6
10. Health professionals keep me healthy.	1	2	3	4	5	6
11. When I stay healthy, I'm just plain lucky.	1	2	3	4	5	6
12. My physical well-being depends on how well I take care of myself.	1	2	3	4	5	6

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
13. When I feel ill, I know it is because I have not been taking care of myself properly.	1	2	3	4	5	6
14. The type of care I receive from othe people is what is responsible for how well I recover from an illness.	1	2	3	4	5	6
15. Even when I take care of myself, it's easy to get sick.	1	2	3	4	5	6
16. When I become ill, it's a matter of fate.	1	2	3	4	5	6
17. I can pretty much stay healthy by taking good care of myself	1	2	3	4	5	6
18. Following doctor's orders to the letter is the best way for me to stay healthy.	1	2	3	4	5	6

EXERCISE 14

SELF-ASSESSMENT: THE STRENGTH OF YOUR SUPPORT NETWORKS

This exercise assesses the quality and level of support in your life in the three major networks: family, friends, and work. After each statement circle the number that best describes how true each statement is for you, as you are feeling now.

I. Family (or Intimate) Support	Very True	Somewhat True	Slightly True	Not True
1. My family (or intimate friends) take time for me when I need it	3	2	1	0
2. My family (or intimate friends) understands when I am upset, and responds to me	3	2	1	0
3. I feel accepted and loved by my family	3	2	1	0
4. My family allows me to do new things and make changes in my life	3	2	1	0
5. My spouse (or partner) accepts my sexuality	3	2	1	0
6. My family gives me as much as I give them	3	2	1	0
7. My family expresses caring and affection to me, and responds to my feelings, such as my anger, sorrow, and love	3	2	1	0
8. The quality of the time I spend with my family is high	3	2	1	0
9. I feel close and in touch with my family	3	2	1	0
10. I am able to give what I would like to my family	3	2	1	0

I. Family (or Intimate) Support (continued)	Very True	Somewhat True	Slightly True	Not True
11. I feel I am important to the people in my family	3	2	1	0
12. I feel that I am honest to the people in my family, and that they are honest to me	3	2	1	0
13. I can ask the people in my family for help when I need it	3	2	1	0
TOTAL I				

A score of 20 or more indicates that you feel a high level of support from your family (or intimate) network.

II. Friendship Support	Very True	Somewhat True	Slightly True	Not True
1. I usually place the needs of others above my own	3	2	1	0
2. I feel I give more than I get from other people	3	2	1	0
3. I find it difficult to share my feelings with other people	3	2	1	0
4. I am not able to give what I would like to other people	3	2	1	0
5. I don't feel cared for or valued by the people around me	3	2	1	0
6. I usually can't find people to spend time with when I want to	3	2	1	0
7. I am often lonely and alone	3	2	1	0
8. I find it hard to ask for what I want	3	2	1	0
9. I don't usually feel close to other people	3	2	1	0

II. Friendship Support (continued)	Very True	Somewhat True	Slightly True	Not True
10. There are few people I can really count on	3	2	1	0
11. Few people know me very well	3	2	1	0
12. People don't seem to want to get to know me	3	2	1	0
13. I tend to hide my sexuality, or feel uncertain about it	3	2	1	0
14. I find it hard to touch other people	3	2	1	0
15. Other people rarely touch or hug me	3	2	1	0
16. I find it hard to ask other people for help	3	2	1	0
17. I am always doing things for other people	3	2	1	0
18. People rarely help me	3	2	1	0
19. When it comes down to it, I feel that I am basically on my own	3	2	1	0
20. I have few friends or people I am close to	3	2	1	0
21. I don't like to spend time with other people	3	2	1	0
22. I feel distant and apart from other people	3	2	1	0
23. I don't expect much from people	3	2	1	0
TOTAL II				

Note that these statements are phrased in negative terms. So in this case, if you have a higher score, you have a less supportive network of friends and acquaintances. A score above 25 indicates that you have weakness in your personal support system and need to take steps to make the relationships you have deeper and more supportive, or to make new and more supportive friendships.

III. Work Support	Very True	Somewhat True	Slightly True	Not True
1. When I run into trouble, there are co-workers I can seek out for help	3	2	1	0
2. The people around me care about me as a person	3	2	1	0
3. I feel I can question and negotiate with supervisors about work assignments	3	2	1	0
4. I am clear about what I am to do and what others expect from me	3	2	1	0
5. I am not usually afraid that co-workers are critical of me behind my back	3	2	1	0
6. People at work are more concerned about getting things done than about competing among themselves	3	2	1	0
7. There are people I talk to each day informally	3	2	1	0
8. I feel my abilities are valued by others at work	3	2	1	0
9. Information is shared freely among people who should know things	3	2	1	0
10. When I can't do something on my own, I can take my problems to others and they will help	3	2	1	0
11. I can ask for guidance and help from superiors	3	2	1	0
12. The climate of my workplace is pleasant and comfortable	3	2	1	0
13. When people are upset about something at work, it is usually talked about	3	2	1	0

III. Work Support (continued)	Very True	Somewhat True	Slightly True	Not True
14. Many things about work are pleasant and enjoyable	3	2	1	0
15. People are given what they need to complete the tasks they are assigned	3	2	1	0
16. There are outlets to help me handle the frustrations and irritations of my work	3	2	1	0
TOTAL III				

Like the family support inventory, this assessment consists of positive statements. A score over 20 indicates a supportive work network and environment.

you feel when you come home? Do you feel loved, safe, happy, protected, and calm? Do you feel angry, frustrated, unsafe, and on guard? Do you feel lonely, unaccepted, neglected, or ignored? The first set of feelings helps your body and psyche relax after the demands and pressures of outside, while the other two response patterns inhibit your attempts to release the stress of the day, or trigger additional defensive stress responses. To manage stress effectively and maintain balance in your life, one of the best resources is a household that is a safe refuge. Even living alone may be preferable to living in an embattled household, in terms of your stress level. Also, having people around you to whom you can turn to share pressures, fears, and struggles is helpful in coping with pressure that cannot be modified. Both friends and family can perform this function.

The support and help from your family, or from the people closest to you in your everyday life, take several forms. There is help with tasks and meeting the day's demands—errands, housework, child care, and financial support. There is also support in having someone to talk to and share things with, for emotional release as well as helpful suggestions and opportunity to reflect on one's life difficulties. There is the knowledge that somebody accepts you as you are and cares for you. And finally, there is the support of having someone to do things with, to share hobbies, leisure activities, and have fun with.

ROSENBERG SELF-ESTEEM SCALE

Please response to each of the following questions by circling one of the four response choices: strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD), to indicate the degree to which you either agree or disagree with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. On the whole, I am satisfied with myself.	SA	A	D	SD
2. At times I think I am no good at all.	SA	A	D	SD
3. I feel that I have a number of good qualities	SA	A	D	SD
4. I am able to do things as well as most other people	SA	A	D	SD
5. I feel I do not have much to be proud of.	SA	A	D	SD
6. I certainly feel useless at times.	SA	A	D	SD
7. I feel that I am a person of worth, at least on an equal plane with others.	SA	A	D	SD
8. I wish I could have more respect for myself.	SA	A	D	SD
9. All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10. I take a positive attitude toward myself.	SA	A	D	SD

SOCIAL SUPPORT AND EXERCISE SURVEY

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question twice. Under *family*, rate how often anyone liveing in your household has said or done what is described during the last three months. Under *friends*, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

Please write one number from the following rating scale on each space.

None	Rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	6

During the past three months, my family (or members of my household) or friends

	Family	Friends
1. Exercised with me.	_____	_____
2. Offered to exercise with me.	_____	_____
3. Gave me helpful reminders to exercise (Are you going to exercise tonight?)	_____	_____
4. Gave me encouragement to stick with my exercise program	_____	_____
5. Changed their schedule so we could exercise together.	_____	_____
6. Discussed exercise with me.	_____	_____
7. Complained about the time I spend exercising.	_____	_____
8. Criticized me or made fun of me for exercising.	_____	_____
9. Gave me rewards to exercising (bought me something or gave me something I like).	_____	_____

None	Rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	6

	Family	Friends
10. Planned for exercise on recreational outings.	_____	_____
11. Helped plan activities around my exercise.	_____	_____
12. Asked me for ideas on how *they* can get more exercise.	_____	_____
13. Talked about how much they like to exercise.	_____	_____

ARTHRITIS SELF-EFFICACY SCALE

ARTHRITIS SELF-EFFICACY SCALE

Self-efficacy pain subscale

In the following questions, we'd like to know how your fibromyalgia pain affects you. For each of the following questions, please circle the number which corresponds to your certainty that you *now* perform the following tasks.

1. How certain are you that you can decrease your pain quite a bit?

1 2 3 4 5 6 7 8 9 10
very uncertain — moderately uncertain — Very Certain

2. How certain are you that you can continue most of your daily activities?

1 2 3 4 5 6 7 8 9 10
Very Uncertain — Moderately Uncertain — Very Certain

3. How certain are you that you can keep fibromyalgia pain from interfering with your sleep?

1 2 3 4 5 6 7 8 9 10
Very UnCertain — Moderately Uncertain — Very Certain

4. How certain are you that you can make a small-to-moderate reduction in your fibromyalgia pain by using methods other than takin medication?

1 2 3 4 5 6 7 8 9 10

Very Uncertain — Moderately Uncertain — Very Certain

5. How certain are you that you can make a large reduction in your fibromyalgia pain by using methods other than taking extra medication?

1 2 3 4 5 6 7 8 9 10

Very Uncertain — Moderately Uncertain — Very Certain

Self-efficacy Function Subscale

We would like to know how confident you are in performing certain daily activities. For each of the following questions, please circle the number which corresponds to your certainty that you can perform the tasks as of *now*, *without* assistive devices or help from another person. Please consider what you *routinely* can do, not what would require a single extraordinary effort.

1. Walk 100 feet on flat ground in 20 seconds?

1 2 3 4 5 6 7 8 9 10

Very Uncertain — Moderately Uncertain — Very Certain

2. Walk 10 steps downstairs in 7 seconds?

1 2 3 4 5 6 7 8 9 10

Very Uncertain — Moderately Uncertain — Very Certain

3. Get out of an armless chair quickly, without using your hands for support?

____

1 2 3 4 5 6 7 8 9 10

Very Uncertain   Moderately Uncertain   Very Certain

4. Button and unbutton 3 medium-size buttons in a row in 12 seconds?

____

1 2 3 4 5 6 7 8 9 10

Very Uncertain   Moderately Uncertain   Very Certain

5. Cut bite-size pieces of meat with a knife and fork in 8 seconds?

____

1 2 3 4 5 6 7 8 9 10

Very Uncertain   Moderately Uncertain   Very Certain

6. Turn an outdoor faucet all the way on and all the way off?

____

1 2 3 4 5 6 7 8 9 10

7. Scratch your upper back with both your right and left hands?

____

1 2 3 4 5 6 7 8 9 10

8. Get in and out of the passenger side of a car without assistance from another person and without physical aids?

____

1 2 3 4 5 6 7 8 9 10

Very Uncertain   Moderately Uncertain   Very Certain

9. Put on a long-sleeve fron-opening shirt or blouse (without buttoning) in 8 seconds?

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

Self-Efficacy Other Symptoms Subscale

In the following questions, we'd like to know how you feel about your ability to control you fibromyalgia. For each of the following questions, please circle the number which corresponds to the certainty that you can *now* perform the following activities or tasks.

1. How certain are you that you can control your fatigue?

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

2. How certain are you that you can regulate your activity so as to be active without aggravating your fibromyalgia?

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

3. How certain are you that you can do something to help yourself feel better if you are feeling blue?

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

4. As compared with other people with fibromyalgia symptoms like yours, how certain are you that you can manage fibromyalgia pain during daily activities?

____

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

5. How certain are you that you can manage your fibromyalgia symptoms so that you can do the things you enjoy doing?

____

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

6. How certain are you that you can deal with the frustration of fibromyalgia?

____

1	2	3	4	5	6	7	8	9	10
Very Uncertain				Moderately Uncertain					Very Certain

NEO-PI CONSCIENTIOUSNESS

PLEASE USE THE FOLLOWING SCALE FOR YOUR RESPONSES TO THE ITEMS BELOW:

1	2.	3	4	5
STRONGLY DISAGREE	DISAGREE		AGREE	STRONGLY AGREE

1. I'm known for my prudence and common sense	1	2	3	4	5
2, I don't take civic duties like voting very seriously	1	2	3	4	5
3. I keep myself informed and ususally make intelligent decisions	1	2	3	4	5
4. I often come into situations without being fully prepared.	1	2	3	4	5
5. I pride myself on my sound judgment.	1	2	3	4	5
6. I don't seem to be completely successful at anything.	1	2	3	4	5
7. I'm a very competent person.	1	2	3	4	5
8. I am efficient and effective at my work.	1	2	3	4	5
9. I would rather keep my options open than plan in advance	1	2	3	4	5
10. I keep my belongings neat and clean	1	2	3	4	5
11. I am not a very methodical person	1	2	3	4	5
12. I like to keep everything in its place so I know just where it is.	1	2	3	4	5
13. I never seem to be able to get organized.	1	2	3	4	5
14. I tend to be somewhat fastidious or exacting.	1	2	3	4	5
15. I'm not compulsive about cleaning	1	2	3	4	5

16. I spend a lot of time looking for things I've misplaced. 1 2 3 4 5

17. I try to perform all the tasks assigned to me conscientiously. 1 2 3 4 5

18. Sometimes I'm not as dependable or reliable as I should be. 1 2 3 4 5

19. I pay my debts promptly and in full. 1 2 3 4 5

20. Sometimes I cheat when I play solitaire. 1 2 3 4 5

21. When I make a commitment, I can always be counted on to follow through. 1 2 3 4 5

22. I adhere strictly to my ethical principles. 1 2 3 4 5

23. I try to do jobs carefully, so they won't have to be done again. 1 2 3 4 5

24. I'd really have to be sick before I'd miss a day of work. 1 2 3 4 5

25. I am easy-going and lackadaisical. 1 2 3 4 5

26. I have a clear set of goals and work toward them in an orderly fashion. 1 2 3 4 5

27. When I start a self-improvement program, I usually let it slide after a few days. 1 2 3 4 5

28. I work hard to accomplish my goals. 1 2 3 4 5

29. I don't feel like I'm driven to get ahead. 1 2 3 4 5

30. I strive to achieve all I can. 1 2 3 4 5

31. I strive for excellence in everything I do. 1 2 3 4 5

32. I'm something of a "workaholic." 1 2 3 4 5

33. I'm pretty good about pacing myself so as to get things done on time. 1 2 3 4 5

34. I waste a lot of time before settling down to work. 1 2 3 4 5

35. I am a productive person who always gets the job done. 1 2 3 4 5

36. I have trouble making myself do what I should. 1 2 3 4 5

37. Once I start a project, I almost always finish it. 1 2 3 4 5

38. When a project gets too difficult, I'm inclined to start a new one. 1 2 3 4 5

39. There are so many little jobs that need to be done that I sometimes just ignore them all. 1 2 3 4 5

40. I have a lot of self-discipline. 1 2 3 4 5

41. Over the years I've done some pretty stupid things. 1 2 3 4 5

42. I think things through before coming to a decision. 1 2 3 4 5

43. Occasionally I act first and think later. 1 2 3 4 5

44. I always consider the consequences before I take action. 1 2 3 4 5

45. I often do things on the spur of the moment. 1 2 3 4 5

46. I rarely make hasty decisions. 1 2 3 4 5

47. I plan ahead carefully when I go on a trip. 1 2 3 4 5

48. I think twice before I answer a question. 1 2 3 4 5

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APPENDIX B

Table B1

Content Validity Results

Self-Efficacy Expectation Items	% of First Group of Raters who Endorsed	% of Second Group of Raters who Endorsed
1	100%	
2	100%	
3	81%	100%
4	100%	
5	81%	100%
6	100%	
7	100%	
8	87%	100%
9	100%	
10	100%	
11	100%	
12	87%	93%
13	100%	
14	100%	
15	100%	93%
16	100%	
17	100%	
18	100%	

Table B1 (Cont'd)

Self-Efficacy Expectation Items	% of First Group of Raters who Endorsed	% of Second Group of Raters who Endorsed
19	75%	86%
20	93%	
21	100%	
22	100%	
23	100%	
24	93%	
25	93%	
26	100%	
27	87%	
28	93%	
29	100%	
30	93%	

Outcome Expectations Items	% of First Group of Raters who Endorsed	% of Second Group of Raters who Endorsed
1	100%	
2	93%	100%
3	93%	100%
4	81%	100%

Table B1 (Cont'd)

Outcome Expectations Items	% of First Group of Raters who Endorsed	% of Second Group of Raters who Endorsed
5	62%	86%
6	93%	100%
7	63%	86%
8	93%	100%
9	93%	100%
10	93%	100%
11	93%	100%
12	86%	100%
13	93%	100%
14	63%	86%
15	93%	100%
16	87%	100%
17	93%	100%
18	93%	100%
19	100%	
20	93%	100%
21	87%	
22	100%	
23	93%	

Table B1 (Cont'd)

Outcome Expectations Items	% of First Group of Raters who Endorsed	% of Second Group of Raters who Endorsed
24	100%	

Table B2

Distribution of Subject Responses to Self-Efficacy Expectation Items on the FSEM

Item Number	0	1	2	3	4	Mean
1	8	17	28	14	5	1.97
2	12	17	28	11	4	1.82
3	4	6	18	25	19	2.65
4	4	6	19	26	17	2.66
5	8	13	24	20	7	2.09
6	5	10	26	25	6	2.38
7	5	12	31	17	7	2.15
8	1	4	19	31	17	2.85
9	2	14	31	22	3	2.17
10	2	8	23	31	7	2.45
11	1	16	33	20	2	2.25
12	1	13	22	28	8	2.54
13	7	10	25	23	5	2.06
14	2	3	18	39	10	3.11
15	2	3	22	33	12	2.69
16	13	23	24	6	6	1.62
17	19	21	21	9	2	1.42
18	10	29	17	10	6	1.62
19	2	4	19	27	20	2.85
20	2	13	25	22	9	2.25
21	3	12	24	22	11	2.93
22	11	12	36	12	1	1.70
23	2	17	32	16	5	2.06
24	2	18	34	16	2	2.01
25	3	10	24	30	5	2.34
26	5	18	26	18	5	2.04
27	5	15	25	18	9	2.17
28	1	12	25	26	7	2.38
29	0	6	20	37	9	2.66
30	19	17	9	13	14	1.87

Table B3

Distribution of Subject Responses to Outcome Expectation Items on the FSEM

Item Number	0	1	2	3	4	Mean
1	3	6	8	28		3.29
2	1	3	6	31		2.92
3	4	3	20	27		2.74
4	4	5	17	27		3.20
5	9	7	11	19		2.63
6	1	8	14	25		2.83
7	11	10	6	18		2.86
8	4	5	13	23		2.58
9	4	7	18	25		2.99
10	2	0	3	31		2.60
11	1	3	9	35		3.38
12	1	5	4	28		3.10
13	0	2	8	32		3.24
14	9	5	13	20		3.26
15	4	9	21	27		2.71
16	3	5	9	32		2.42
17	1	7	11	30		2.90
18	2	10	14	25		2.89
19	0	2	9	29		2.74
20	2	4	9	36		3.28
21	3	7	22	25		2.97
22	1	8	16	19		2.58
23	6	11	25	19		2.81
24	0	8	17	28		2.72

Table B4

Results of the Multivariate Regression using the Covariates as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.3712	3.166	5.397	*.001
Anxiety	.2833	2.011	2.782	*.014
Somatization	.2603	1.442	3.218	*.036
Active Coping	.1021	2.011	1.040	.413
Passive Coping	.1259	67.154	1.317	.257
Catastrophizing	.2429	159.846	2.934	*.010
Diverting Attention	.1016	46.180	1.034	.417
Ignoring	.0304	24.181	.286	.957
Increasing Behavior	.0874	24.015	.876	.531
Pray/Hope	.1122	80.091	1.156	.311
Reinterpretation	.0949	39.765	.958	.469
Coping Self-Statements	.0844	36.447	.842	.557
Time spend exercising in minutes during past week	.0671	34.885	.657	.707
Number of types of exercises attempted in past week	.2020	3.203	2.318	.036
Number of Physician appointments in past year	.2444	449.422	2.951	*.010

Table B4 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Days taken off from work or daily activities in past month	.0701	31.972	.689	.681
Days taken off from work or daily activities in past year	.1260	4819.928	1.318	.256
Hours at work/week	.0550	395.344	.960	.468
Number of medications taken for fibromyalgia symptoms	.1594	5.005	1.733	.117
Sickness Impact	.5052	1305.653	9.336	*.001
SI Physical	.4201	4893.728	6.622	*.001
Ambulation	.4437	780.184	7.294	*.001
Mobility	.2918	594.755	3.768	*.002
Body Care and Movement	.4048	588.750	6.218	*.001
SI Psychosocial	.4722	25326.100	8.180	*.001
Social Interaction	.5539	2290.376	11.351	*.001
Alertness Behavior	.3803	3654.909	5.612	*.001
Emotional Behavior	.2100	1256.995	2.431	*.028
Communication	.3143	687.180	4.190	*.001
Sleep and Rest	.3043	1156.701	3.999	*.001

Table B4 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Eating	.1231	62.497	1.283	*.273
Work	.1623	1549.381	1.772	.109
Home Management	.3971	1853.225	6.021	*.001
Recreation and Pastimes	.2785	437.365	3.523	*.003

Table B5

Results of the Multivariate Regression using the Covariates and Self-Efficacy Expectations as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.4259	3.179	5.843	*.001
Anxiety	.4578	3.453	6.649	*.001
Somatization	.4010	1.946	5.281	*.001
Active Coping	.3109	64.504	3.552	*.002
Passive Coping	.2450	114.328	2.556	*.018
Catastrophizing	.3128	180.074	3.584	*.002
Diverting Attention	.2795	111.142	3.055	*.006
Ignoring	.1494	104.182	1.384	.221
Increasing Behavior	.2012	48.370	1.984	.063
Pray/Hope	.1189	74.241	1.062	.401
Reinterpretation	.1212	44.437	1.086	.385
Coping Self-Statements	.2067	78.140	2.052	.054
Time spend exercising in minutes during past week	.0717	53966.915	.680	.768
Number of types of exercises attempted in past week	.2819	3.907	3.091	*.005
Number of Physician appointments in past year	.2474	398.823	2.589	*.016

Table B5 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Days taken off from work or daily activities in past month	.0703	28.077	.596	.778
Days taken off from work or daily activities in past year	.1274	4262.830	1.149	.344
Number of medications taken for fibromyalgia symptoms	.1712	4.706	1.627	.135
Hours at work/week	.0952	346.589	.828	.581
Sickness Impact	.5636	1274.422	10.170	*.001
SI Physical	.4680	4770.286	6.926	*.001
Ambulation	.4733	728.157	7.077	*.001
Mobility	.3318	591.776	3.911	*.001
Body Care and Movement	.4579	582.687	6.651	*.001
SI Psychosocial	.5420	25435.166	9.319	*.001
Social Interaction *.001	.5615	2031.816	10.085	
Alertness Behavior	.4168	3504.821	5.628	*.001
Emotional Behavior	.3170	1659.732	3.654	*.001
Communication	.3678	703.688	4.581	*.001
Sleep and Rest	.3210	1067.786	3.724	*.001

Table B5 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Eating	.1354	60.172	1.233	.295
Work	.1671	1395.977	1.580	.149
Home Management	.4325	1766.160	6.001	*.001
Recreation and Pastimes	.3112	1509.234	3.558	*.002

Table B6

Results of the Multivariate Regression using Covariates and Outcome Expectations as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.4081	3.046	5.430	*.008
Anxiety	.3084	2.327	3.512	*.002
Somatization	.3136	1.520	3.597	*.002
Active Coping	.2985	61.936	3.351	*.003
Passive Coping	.1583	73.852	1.481	.182
Catastrophizing	.2536	145.997	2.675	*.013
Diverting Attention	.1674	66.558	1.583	.148
Ignoring	.1798	128.334	1.726	.110
Increasing Behavior	.2883	69.297	3.190	*.004
Pray/Hope	.1125	70.283	.999	.446
Reinterpretation	.1948	71.421	1.905	.075
Coping Self-Statements	.1873	70.792	1.815	.009
Time spend exercising in minutes during past week	.1113	83.810	.986	.455
Number of types of exercises attempted in past week	.2024	2.805	1.998	.061
Number of Physician appointments in past year	.2462	396.772	2.572	*.017

Table B6 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Days taken off from work or daily activities in past month	.0780	31.146	.666	.719
Days taken off from work or daily activities in past year	.1266	4236.622	1.411	.349
Number of medications taken for fibromyalgia symptoms	.2234	6.140	2.265	*.034
Hours at work/week	.1070	389.716	.944	.488
Sickness Impact	.5232	1183.173	8.643	*.001
SI Physical	.5007	5101.012	7.887	*.001
Ambulation	.4839	744.383	7.383	*.001
Mobility *.001	.3458	616.747	4.163	
Body Care and Movement	.4857	618.109	7.437	*.001
SI Psychosocial	.4911	23045.235	7.599	*.001
Social Interaction	.5679	2054.852	10.350	*.001
Alertness Behavior	.3807	3204.227	4.849	*.001
Emotional Behavior	.2374	1243.126	2.451	*.022

Table B6 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Communication	.3537	676.773	4.310	*.001
Sleep and Rest	.3361	1117.713	3.986	*.001
Eating	.1251	55.566	1.126	.359
Work	.4454	1357.583	1.528	.165
Home Management	.4454	1819.002	6.325	*.001
Recreation and Pastimes	.2881	1397.207	3.187	*.004

Table B7

Results of the Multivariate Regression using Covariates and Exercise Self-Efficacy as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.3736	2.782	4.697	*.001
Anxiety	.2359	48.948	2.431	*.009
Somatization	.3055	1.481	3.464	*.002
Active Coping	.2359	48.948	2.431	*.023
Passive Coping	.1261	58.830	1.136	.352
Catastrophizing	.2447	140.891	2.552	*.018
Diverting Attention	.1513	60.151	1.403	.213
Ignoring	.0740	51.585	.629	.750
Increasing Behavior	.1401	33.680	1.283	.268
Pray/Hope	.1502	93.830	1.392	.217
Reinterpretation	.1347	49.414	1.226	.299
Coping Self-Statements	.1641	62.012	1.545	.160
Time spend exercising in minutes during past week	.0998	75144.142	.873	.544
Number of types of exercises attempted in past week	.2365	3.278	2.440	*.023
Number of Physician appointments in past year	.2457	396.025	2.565	*.017

Table B7 (Cont'd)

Dependent of Variable	R2	MS	F	Significance F
Days taken off from work or daily activities in past month	.0719	28.719	.610	.766
Days taken off from work or daily activities in past year	.1260	4217.445	1.135	.353
Number of medications taken for fibromyalgia symptoms	.1606	4.413	1.506	.173
Hours at work/week	.1220	444.180	1.094	.379
Sickness Impact	.5283	1194.572	8.819	*.001
SI Physical	.4672	4762.625	6.905	*.001
Ambulation	.4860	747.698	7.447	*.001
Mobility	.2939	524.024	3.277	*.003
Body Care and Movement	.4588	583.830	6.675	*.001
SI Psychosocial	.5349	25104.067	9.058	*.001
Social Interaction	.5850	2166.621	11.100	*.001
Alertness Behavior	.4172	3508.141	5.638	*.001
Emotional Behavior	.2720	1424.324	2.942	*.007
Communication	.3489	667.532	4.219	*.001

Table B7 (Cont'd)

Dependent of Variable	R2	MS	F	Significance F
Sleep and Rest	.3066	1019.674	3.482	*.002
Eating	.1327	58.949	1.205	.311
Work	.1624	1356.588	1.527	.166
Home Management	.4015	1639.528	5.282	*.001
Recreation and Pastimes	.3066	1019.674	3.482	*.006

Table B8

Results of the Multivariate Regression using Covariates, Self-Efficacy Expectations, Outcome Expectations as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.4452	2.953	5.528	*.001
Anxiety	.4842	3.246	6.466	*.007
Somatization	.4218	1.817	5.025	*.001
Active Coping	.4272	78.789	5.137	*.001
Passive Coping	.2546	105.593	2.353	*.024
Catastrophizing	.3143	106.855	3.158	*.003
Diverting Attention	.3042	107.545	3.010	*.005
Ignoring	.2462	152.585	2.250	*.030
Increasing Behavior	.3431	73.308	3.598	*.001
Pray/Hope	.1189	65.994	.929	.506
Reinterpretation	.2023	65.950	1.747	.097
Coping Self-Statements	.2653	89.145	2.488	*.017
Time spend exercising in minutes during past week	.1265	84,674.665	.997	.452
Number of types of exercises attempted in past week	.2890	3.560	2.780	*.008
Number of Physician appointments in past year	.2514	360.238	2.314	*.026

Table B8 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Days taken off from work or daily activities in past month	.0795	28.228	.595	.795
Days taken off from work or daily activities in past year	.1285	3823.714	1.016	.438
Number of medications taken for fibromyalgia symptoms	.2257	5.514	2.008	*.053
Hours at work/week	.1072	347.046	.827	.594
Sickness Impact	.5695	1144.749	9.114	*.001
SI Physical	.5240	478.410	7.584	*.001
Ambulation	.4999	683.558	6.885	*.001
Mobility	.3675	582.617	4.003	*.001
Body Care and Movement	.5131	580.362	7.258	*.001
SI Psychosocial	.5476	22840.626	8.337	*.001
Social Interaction *.001	.5715	1838.198	9.189	
Alertness Behavior	.4172	683.558	6.885	*.001
Emotional Behavior	.3246	1510.964	3.311	*.002
Communication	.3891	661.814	4.388	*.001
Sleep and Rest	.3438	1016.513	3.610	*.001

Table 8 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Eating	.1357	53.610	1.082	.389
Work	.1682	1249.011	1.393	.211
Home Management *.001	.4645	1686.258	2.250	
Recreation and *.001 Pastimes	.3438	1016.513	3.610	

Table B9

Results of the Multivariate Regression using Covariates, Self-Efficacy Expectations, Outcome Expectations and Exercise Self-Efficacy as Predictors

Dependent Variable	R2	MS	F	Significance of F
Depression	.4481	2.674	4.952	*.001
Anxiety	.4844	2.923	5.730	*.001
Somatization	.4259	1.652	4.526	*.001
Active Coping	.4603	76.417	5.203	*.001
Passive Coping	.2813	105.017	2.388	*.018
Catastrophizing	.3393	156.288	3.133	*.003
Diverting Attention	.3073	97.765	2.706	*.008
Ignoring	.2499	139.368	2.032	*.045
Increasing Behavior	.3497	67.246	3.280	*.002
Pray/Hope	.1790	89.433	1.330	.235
Reinterpretation	.2187	64.175	1.708	.099
Coping Self-Statements	.2859	86.433	2.442	.016
Time spend exercising in minutes during past week	.1609	96,980.741	1.170	.328
Number of types of exercises attempted in past week	.2971	3.294	2.579	*.011
Number of Physician appointments in past year	.2521	325.049	2.056	*.042

Table B9 (Cont'd)

Dependent Variable	R2	MS	F	Significance of F
Days taken off from work or daily activities in past month	.0818	26.123	.543	.852
Days taken off from work or daily activities in past year	.1287	3446.040	.901	.538
Number of medications taken for fibromyalgia symptoms	.2358	5.185	1.882	.065
Hours at work/week	.1342	391.084	.946	.499
Sickness Impact	.5730	1036.559	8.186	*.001
SI Physical	.5402	4405.610	7.167	*.001
Ambulation	.5194	639.214	6.592	*.001
Mobility	.3699	527.658	3.580	*.001
Body Care and Movement	.5324	542.018	6.945	*.001
SI Psychosocial	.5721	21,479.418	8.157	*.001
Social Interaction	.5933	1717.446	8.899	*.001
Alertness Behavior	.5194	639.214	6.592	*.001
Emotional Behavior	.3410	1428.655	3.157	*.003
Communication	.3982	609.477	4.036	*.001
Sleep and Rest	.3440	915.320	3.199	*.002

Table B9 (Cont'd)

Dependent Variable	R2	MS		Significance of F
Eating	.1392	49.484	.987	.465
Work	.1685	1125.639	1.236	.287
Home Management	.4649	1518.856	5.300	*.001
Recreation and Pastimes	.3440	915.320	3.199	*.002

Table B10

Beta Values of Predictor Variables for each Multivariate Analysis

Dependent Variables	Predictor Variables									
	Age	Duration	Family Support	Friend Support	Intensity	Sites	Sleep Q	SE	OE	ExSE
Anxiety										
Covariates	.264	-.157	-.213	.153	.268	.371	-.004			
Cov + SE	-.196	-.036	-.068	.086	.090	.112	.043	-.543		
Cov + OE	-.297	.011	-.242	.160	.103	.057	-.007		-.296	
Cov + ExSE	-.289	-.021	-.193	.156	.124	-.021	-.058			-.197
Cov + SE + OE	-.212	-.004	-.088	.100	.061	.134	.066	-.496	-.181	
Cov + SE + OE + ExSE	-.236	-.006	-.090	.098	.063	.138	.068	-.502	-.182	.017
Depression										
Covariates	-.076	-.113	-.471	.102	.023	.034	-.119			
Cov + SE	-.061	.116	-.390	.072	-.012	.087	-.068	-.268		
Cov + OE	-.123	.151	-.478	.112	-.018	.070	-.081		-.207	
Cov + ExSE	-.093	.119	-.460	.104	.013	.027	-.118			-.054
Cov + SE + OE	-.101	.114	-.407	.084	-.307	.106	-.048	-.228	-.154	
Cov + SE + OE + ExSE	-.080	.138	-.413	.078	-.029	.120	-.043	-.252	-.159	.064
Somatization										
Covariates	-.139	.115	-.228	.060	.320	-.044	-.082			
Cov + SE	-.115	.120	-.097	.013	.264	.041	-.000	-.431		
Cov + OE	-.199	.160	-.236	.072	-.272	-.000	-.037		-.249	
Cov + ExSE	-.214	.141	-.180	.072	.277	-.075	-.079			-.234
Cov + SE + OE	-.156	.148	-.115	.025	.239	.061	.021	-.389	-.159	
Cov + SE + OE + ExSE	-.181	.156	-.108	.031	.229	.044	.015	-.360	-.153	-.077
Active Coping										
Covariates	-.114	.062	.234	.006	-.034	.182	.082			
Cov + SE	-.143	.056	.075	.064	.034	.079	-.017	.524		
Cov + OE	.002	-.025	.250	-.017	.059	.098	-.004		.478	
Cov + ExSE	.015	-.017	.153	-.014	.041	.236	.077			.403
Cov + SE + OE	-.045	-.013	.118	.035	.095	.032	-.067	.424	.379	
Cov + SE + OE + ExSE	.025	-.033	.099	.016	.122	.080	-.051	.342	.364	.218

Table B10 (Cont'd)

Dependent Variables	Predictor Variables									
	Age	Duration	Family Support	Friend Support	Intensity	Sites	Sleep Q	SE	OE	ExSE
Passive Coping										
Covariates	.181	-.026	-.043	.095	.064	.077	-.240			
Cov + SE	.203	-.021	.077	.051	.013	.155	-.165	-.396		
Cov + OE	.134	.010	-.049	.104	.027	.111	-.205		-.194	
Cov + ExSE	.186	-.027	-.046	.094	.067	.079	-.241			.014
Cov + SE + OE	.175	-.001	.065	.059	-.005	.169	-.151	-.367	-.109	
Cov + SE + OE +ExSE	.238	-.020	.047	.042	.019	.212	-.137	-.441	-.122	.196
Diverting Attention										
Covariates	-.194	-.037	.254	.053	.029	.115	.047			
Cov + SE	-.221	-.043	.108	.107	.092	.020	-.044	.483		
Cov + OE	-.127	-.088	.264	.040	.083	.067	-.003		-.276	
Cov + ExSE	-.116	-.065	.205	.042	.074	.148	.044			.246
Cov + SE + OE	-.176	-.075	.127	.094	.120	-.002	-.067	.438	.175	
Cov + SE + OE + ExSE	-.154	-.081	.121	.088	.128	.013	-.063	.413	.170	.066
Ignoring										
Covariates	-.091	-.087	.036	.057	.027	.114	.040			
Cov + SE	-.113	-.092	-.084	.101	.078	.037	-.035	.396		
Cov +OE	.010	-.164	.050	.037	.108	.041	-.036		.417	
Cov + ExSE	-.017	-.113	-.011	.046	.145	.037				.230
Cov + SE + OE	-.024	-.155	-.045	.074	.134	-.006	-.081	.305	.346	
Cov + SE + OE +ExSE	-.000	-.161	-.052	.068	.143	.010	-.075	.278	.341	.072
Increasing Behavior										
Covariates	-.072	-.069	.178	.018	.120	.159	.150			
Cov + SE	-.094	-.074	.061	.061	.170	.083	.076	.387		
Cov + OE	.045	-.158	.194	-.005	.214	.074	.062		.483	
Cov + ExSE	.009	-.098	.127	.006	.167	.193	.146			.253
Cov + SE +OE	.014	-.150	.108	.029	.238	.031	.021	.277	.419	
Cov + SE + OE + ExSE	.045	-.159	.099	.021	.250	.053	.028	.240	.412	.097

Table B10 (Cont'd)

Dependent Variables	Predictor Variables									
	Age	Duration	Family Support	Friend Support	Intensity	Sites	Sleep Q	SE	OE	ExSE
Pray/Hope										
Covariates	.216	-.158	.274	.037	.137	.007	-.123			
Cov + SE	.222	-.157	.302	.027	.124	.026	-.105	-.094		
Cov + OE	.212	-.155	.273	.038	.133	.011	-.119		-.019	
Cov + ExSE	.285	-.182	.230	.027	.176	.036	-.126			.215
Cov + SE + OE	.222	-.157	.302	.026	.125	.025	-.105	.094	.002	
Cov + SE + OE +ExSE	.317	-.187	.276	.001	.161	.090	-.084	.205	.018	.293
Reinterpretation										
Covariates	-.105	.076	-.045	.019	-.298	-.026	.092			
Cov + SE	-.115	.074	-.102	.040	-.274	-.063	-.127	.186		
Cov +OE	-.023	.014	-.034	.003	-.232	-.086	-.154		.341	
Cov + ExSE	-.035	.051	-.090	.008	-.257	.003	-.095			.220
Cov + SE + OE	-.034	.017	-.066	.015	-.223	-.102	-.169	.103	.317	
Cov + SE + OE + ExSE	.016	.002	-.080	.002	-.204	-.068	-.158	.045	.306	.153
Coping Self-Statements										
Covariates	-.072	-.068	.252	.012	-.036	.145	-.039			
Cov + SE	-.092	-.072	.130	.033	.016	.067	-.115	.401		
Cov + OE	.014	-.131	.264	-.028	.031	.085	-.102		.346	
Cov + ExSE	.030	-.103	.189	-.027	.021	.187	-.043			.311
Cov + SE + OE	-.023	-.121	.161	.012	.059	.033	-.151	.330	.269	
Cov + SE + OE + ExSE	.033	-.137	.145	-.003	.080	.071	-.138	-.269	.257	.171
Exercise										
Covariates	-.152	.124	.098	.018	-.145	.126	.067			
Cov + SE	-.156	.123	.074	.027	-.135	.111	.052	.078		
Cov + OE	-.207	-.165	-.090	.029	-.189	.166	-.108		-.227	
Cov + ExSE	-.088	.101	.058	.009	-.108	.152	.064			.199
Cov + SE + OE	-.223	.170	.045	.047	-.177	.143	.087	.146	-.260	
Cov + SE + OE + ExSE	-.151	.149	.025	.027	-.150	.192	.102	.062	-.276	.222

Table B10 (Cont'd)

Dependent Variables	Predictor Variables									
	Age	Duration	Family Support	Friend Support	Intensity	Sites	Sleep Q	SE	OE	ExSE
Types of Exercises										
Covariates	-.260	.113	.053	-.027	-.036	.035	.362			
Cov + SE	-.278	-.117	-.046	.009	.006	-.029	.300	.324		
Cov + OE	-.263	-.111	.052	-.027	-.039	.037	.364		-.013	
Cov + ExSE	-.195	-.136	.011	-.037	.002	.062	.359			.199
Cov + SE + OE	-.302	-.100	-.056	.016	-.009	-.017	.313	.348	-.094	
Cov + SE + OE + ExSE	-.262	-.110	-.066	.006	.004	.007	.321	.307	-.101	.222
Number of Appointments										
Covariates	-.400	.053	.034	.177	.086	.143	.263			
Cov + SE	-.395	-.046	.054	.169	.077	.156	.276	-.067		
Cov + OE	-.387	.052	.036	.174	.095	.134	.254		.050	
Cov + ExSE	-.413	.011	.043	.179	.077	.137	.264			-.046
Cov + SE + OE	-.377	-.056	.062	.164	.088	.148	.267	-.086	.070	
Cov + SE + OE + ExSE	-.387	-.066	.065	.167	.084	.141	.265	-.074	.072	-.030
Days off per Month										
Covariates	.044	-.166	-.019	-.121	.147	.150	.103			
Cov + SE	.045	-.166	-.013	-.123	.144	.153	.167	-.018		
Cov + OE	.067	-.184	-.016	-.125	.165	.133	.096		.096	
Cov + ExSE	.028	-.161	.009	-.118	.138	.144	.114			-.048
Cov + SE + OE	.072	-.185	-.001	-.131	.161	.141	.103	-.246	.107	
Cov + SE + OE + ExSE	.054	-.180	.004	-.126	.154	.128	.098	-.025	.111	-.057
Days off per Year										
Covariates	-.035	-.164	-.145	.025	.041	.211	.268			
Cov + SE	-.033	-.163	-.132	.120	.036	.219	.276	-.042		
Cov + OE	-.029	-.169	-.144	.023	.046	.206	.264		.026	
Cov + ExSE	-.035	-.164	-.145	.025	.041	.211	.268			.001
Cov + SE + OE	-.023	-.170	-.128	.017	.042	.214	.274	-.052	.038	
Cov + SE + OE + ExSE	-.018	-.172	-.129	.016	.044	.218	.272	-.058	.016	.016

Table B10 (Cont'd)

Dependent Variables	Predictor Variables									
	Age	Duration	Family Support	Friend Support	Intensity	Sites	Sleep Q	SE	OE	ExSE
<u>Medications</u>										
Covariates	-.005	.025	-.128	.020	-.046	.358	.018			
Cov + SE	.002	.026	-.090	.006	-.062	.383	.042	-.125		
Cov + OE	-.071	.075	-.137	.033	-.099	.406	.067		-.273	
Cov + ExSE	.007	.020	-.136	.018	-.039	.363	.017			.039
Cov + SE + OE	-.065	.073	-.119	.026	-.104	.415	.076	-.057	-.260	
Cov + SE + OE +ExSE	-.026	.011	-.130	.015	-.089	.441	.084	-.120	-.268	.120
<u>Hours Working</u>										
Covariates	-.108	-.124	.289	.098	-.016	-.026	-.099	.015		
Cov + SE	-.109	-.124	.284	.010	-.014	-.029	-.102		.118	
Cov + OE	-.079	-.140	.293	.092	.007	-.040	-.120			.181
Cov + ExSE	-.050	-.144	.252	.089	.017	-.001	-.101			
.Cov + SE + OE	-.078	-.146	.298	.090	.005	-.044	-.118	-.017	.122	
Cov + SE + OE + ExSE	-.014	-.165	.280	.073	.029	.000	-.104	-.091	.108	.197
<u>Sickness Impact</u>										
Covariates	.054	-.161	-.388	.201	.165	.192	-.170			
Cov + SE	.069	-.158	-.301	.170	.129	.246	-.117	-.277		
Cov + OE	.019	-.135	.390	.208	.137	.217	-.144		-.145	
Cov + ExSE	.001	-.142	.352	.209	.134	.170	-.168			-.167
Cov + SE + OE	.047	-.142	.311	.177	.115	.257	-.106	.254	-.086	
Cov + SE + OE + ExSE	.025	-.135	-.305	.183	.106	.211	-.111	-.228	-.081	-.070

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