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Analysis of Perceived Stress, Perceived Stress Management, and Symptom Severity in Women with
Fibromyalgia

A Project Presented to
the Faculty of the Undergraduate
College of Health and Behavioral Studies
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science

by Mavis Leigh Hodges

May 2014

Accepted by the faculty of the Department of Health Sciences, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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Abstract

The purpose of this study was to further investigate the relationship between perceived stress and symptom severity in women with fibromyalgia and analyze the relationship between perceived stress management and symptom severity. This quasi-experimental, mixed methods design consisted of an anonymous online survey using three different instruments that measured perceived stress levels, symptom severity, and perceived effectiveness of stress management. Thirty-four women living in Virginia diagnosed with fibromyalgia participated in the study. The women in the sample were separated into groups depending on their perceived level of stress and perceived effectiveness of stress management. T-tests were conducted to compare symptom factors across the cohorts. Significant differences and meaningful differences were found between groups for certain symptom factors. According to the results, fatigue, depression, anxiety, overall mean symptom scores, the number of days that patients missed events, and the number of days that patients felt bad were positively associated with increased levels of perceived stress. Lower levels of perceived stress management effectiveness were negatively associated with physical impairment, pain levels, difficulty in work ability, depression, overall mean symptom scores, stiffness, and poorer sleep quality. Common stress management techniques included spending time with others/pets, reading, listening to music, and withdrawing from activities. Avoiding stressful people/events and listening to music were reported as the most effective ways to avoid stress and manage stress, respectively.

Chapter 1 - Introduction

Introduction

Fibromyalgia Syndrome (FMS) is a chronic disease that causes a variety of common symptoms including muscle pain, soreness, stiffness, fatigue, sensitivity, cognitive difficulties, and sleep disturbances. Other overlying symptoms may occur such as irritability in the bowel and bladder, headaches, restless leg syndrome, rashes, anxiety, depression, ringing in the ears, vision problems, Raynaud's Syndrome, as well as other neurological symptoms. The majority of patients with FMS are women. There are several theories that suggest different causes for fibromyalgia, yet there is no one definitive cause. Fibromyalgia has no cure, and treatment is very difficult due to the complexity of the disease (National Fibromyalgia Association [NFA], 2009).

Patients with FMS either experience a slow onset of symptoms or develop the disease from a sudden traumatic sickness or injury. Researchers propose many possibilities for the development of FMS including neuroendocrine irregularities, abnormal processing of the central nervous system, and physiological anomalies such as higher levels of substance P in the nervous system, low blood flow to the thalamus, low functioning of the hypothalamic-pituitary-adrenal (HPA) axis, decreased levels of serotonin and tryptophan, and irregular cytokine functioning. Studies also show that FMS is strongly linked to genetic predisposition (NFA, 2009).

Fibromyalgia treatment is intended to manage the symptoms and should involve all of the dimensions of one's health. Medical prescriptions such as Lyrica®, Cymbalta®, and Savella® are commonly used to treat pain. Non-narcotic pain relievers, antidepressants, and lidocaine pain relieving injections are also helpful for some patients. Low weight bearing exercise and stretching can also help alleviate pain and other symptoms. Support groups are commonly utilized to help patients and families better understand FMS and help with the emotional difficulties in coping with a chronic disease. Alternative therapies are also quite common and some of these include massage

therapy, chiropractic adjustment, yoga, relaxation and breathing techniques, physical therapy, acupuncture, water therapy, light aerobics, herbal and nutritional supplementation, myofascial release, and cognitive therapy (NFA, 2009). FMS treatment varies and should be adjusted according to the lifestyle and needs of each patient.

Significance of Study

Current research has indicated a strong link between perceived stress, or the amount of stress in one's life as perceived by that individual, and the severity of symptoms in FMS patients. The purpose of this study is to further examine the intricate role that perceived stress plays on symptom severity and analyze the relationship between stress management and symptom severity in adult women with FMS.

Statement of the Problem

Although research (e.g., Daniels, Murray, C., & Murray, T., 2006; Drummond & Willox, 2013; Juster, McEwen, & Lupien, 2009; McEwen & Kalia, 2010; Murray, T., Murray, C., & Daniels, 2007; Stoppler, 2013; Theadom & Copley, 2008) purports that perceived stress is a great determining factor in symptom severity, there is minimal research regarding the effects of stress management on symptom severity in FMS patients.

Research Hypothesis

Per the current study, it was hypothesized that FMS patients with better stress management skills (i.e., higher perceived stress management and use of stress management techniques) will have a lower severity of symptoms than those patients who do not practice effective stress management.

Research Questions

-Are higher perceived levels of stress among FMS patients positively associated with symptom severity, as determined by the FIQ?

-Do FMS patients with a higher perception of effective stress management have a decreased

severity in symptoms, as determined by the FIQ?

-Do FMS patients that engage in more stress management techniques have a decrease in symptom severity, as determined by the FIQ?

Limitations of the Study

There are several limitations associated with this study. First and foremost, women participants were recruited via a convenience, non-probability sample. Due to non-random sampling, the results of this study are limited and may not be representative of the entire population of women with FMS. Therefore, it may not be possible to generalize about the FMS population as a whole based on the results of the current study.

In an attempt to control for the differences between sexes on a physiological and psychological level, the study was limited to adult women that reside in Virginia. A very important limitation to this study involves the method in which the data was collected. The survey's answers are based on self-reporting by the patient. In other words, the results are based solely on what each patient thinks and feels, which is not standardized and will vary from person to person, and may not be accurate or honest.

Lastly, it is important to understand that there are many other factors, other than levels of perceived stress and stress management techniques, which also affect the severity of fibromyalgia symptoms. Unfortunately, factors that cannot be controlled for may affect the results of the study.

Definitions of Terms

Restless leg syndrome: A condition causing uneasy and restless feelings in the legs while sitting or lying down.

Raynaud's Syndrome: A condition in which cold temperatures and stress narrow the arteries that supply blood to the skin, causing cold, numb areas in the body including the fingers, toes, nose, and ears.

Neuroendocrine: Involving both the nervous and endocrine systems of the body.

Substance P: A chemical substance involved in nerve transmission of pain.

Thalamus: A brain structure important in relaying sensory information and pain perception.

Hypothalamic-pituitary-adrenal (HPA) axis: Complex interactions among the hypothalamus and pituitary structures of the brain as well as the adrenal glands located on top of the kidneys

(Dictionary.com, 2014).

Chapter 2 - Literature Review

Introduction

Fibromyalgia Syndrome (FMS), which is also known as fibromyositis or fibrositis, affects 10 million Americans physically, mentally, and socially. Women, men, children, and people of all races are affected by FMS and for some it can be extremely unbearable. Given that there is not one single test to diagnose FMS, a correct diagnosis requires a knowledgeable physician to rule out all other possibilities before making a final diagnosis (National Fibromyalgia Association [NFA], 2009). The unique, characteristic symptom of fibromyalgia is the presence of tender points throughout the body, which can cause pain in up to 28 different localized areas. Interestingly, patients with FMS have a decreased threshold for pain and are more sensitive to stress (McEwen & Kalia, 2010). Previous research has indicated a strong link between chronic stress, either psychological or perceived stress, and fibromyalgia as well as several other chronic conditions (Daniels, Murray, C., & Murray, T., 2006; Drummond & Willox, 2013; Juster, McEwen, & Lupien, 2009; McEwen & Kalia, 2010; Murray, T., Murray, C., & Daniels, 2007; Stoppler, 2013; Theadom & Cropley, 2008). Chronic or prolonged stress can have a profound effect on the body, particularly on the nervous and endocrine systems. However, researchers are still not certain as to whether the abnormalities in patients with chronic conditions are the actual cause of chronic disease or the result of having a stress-related disorder (McEwen & Kalia, 2010).

Stress

Stress is defined as any factor that disturbs the body physically or mentally (Stoppler, 2013). Examples include trauma, infection, toxins, illness, or emotional stressors. There are certain factors that can make people more vulnerable to stress as well as factors that can protect them from stress. Factors that decrease the body's ability to handle stress include poor nutrition, poor sleep, and physical ailments. However, great social support from family, friends, and organizations can offer

protection from the harmful effects of stress (Stoppler, 2013). One of the initial physiological responses to stress includes the stimulation of the hypothalamic-pituitary-adrenal axis (HPA axis), which in turn controls the body's reaction to stress and is also involved in both acute and chronic pain (McEwen & Kalia, 2010). Unfortunately, any type of change in the HPA axis activity can have several adverse effects on the body systems to which it is connected. As a result, some structures in the brain increase or decrease in size, which can then cause them to wear out and leave the body vulnerable to stress-related illness. Furthermore, changes in the brain's ability to generate neurons and alterations in the neurons' synapses and dendrites decrease the body's capability to react to stress (Juster et al., 2009).

Stress and Chronic Disease

Multiple studies have indicated that psychological stress can aggravate and negatively affect nearly all known medical conditions. Stress is known to increase the severity of symptoms in cardiovascular disease, asthma, multiple sclerosis, chronic pain, acne, fibromyalgia, and depression (Stoppler, 2013). The prolonged secretion of stress hormones (epinephrine, norepinephrine, and cortisol) can, in fact, begin to damage the body and the brain instead of serving a protective role as intended. Eventually, the physiological irregularities lead to disorder and unhealthy outcomes for the body (Juster et al., 2009). Munce and colleagues (2006) examined chronic pain, stress, and depression among employed adults, and indicated that stress, specifically work-related stress, is the greatest predictor for depression and chronic pain (Munce et al., 2006). Similarly, McEwen and Kalia (2010) showed that psychological stress can become physical pain, yet the exact effect that chronic stress has on pain is not yet fully understood.

Perceived Stress and Fibromyalgia

Multiple studies have shown a strong relationship between fibromyalgia and perceived stress. Theadom and Cropley (2008) analyzed attitudes about sleep and perceived stress among patients

with and without FMS, including self-reported measures of pain, fatigue, stress, and sleep quality. Results showed that FMS patients have more flawed beliefs about sleep and stress than the control group, which was accompanied by an increase in perceived stress and a decrease in sleep quality. In addition, two related studies looked closely at the factors associated with fibromyalgia to determine which factors affected symptoms the most. The results indicated significantly higher levels of perceived stress in patients with more severe symptoms (Daniels et al., 2006). Murray and colleagues (2007) conducted a follow-up study to further examine the effect of stress on FMS symptoms, which showed that the greatest variable that could predict severity of FMS symptoms were levels of perceived stress. Likewise, among a sample of FMS patients and rheumatoid arthritis patients, Drummond and Willox (2013) found that abnormal stress mechanisms in the body – both at rest and during stressful activity/stimuli - may be a probable cause of pain in FMS patients.

Neuroendocrine research also provides strong evidence supporting the idea that chronic stress is involved in the development of FMS. Patients with fibromyalgia seem to exhibit an underactive HPA axis, which is also known to cause pain. Chronic stress has been proven to decrease both growth hormones and oestrogens within the body, and interestingly FMS patients tend to have low levels of both of these hormones. Low levels of oestrogens also decrease the amount of serotonin in the body (Gupta & Sliman, 2004). Low levels of serotonin increase the levels of substance P, which is a neurotransmitter that alerts the body of pain. As a result, the perception of pain is increased, because substance P is found in the brain and spinal cord, not the actual site of pain. Normally, women are not able to produce as much serotonin as men. Therefore, this could be one reason as to why females are much more likely to suffer with FMS than males (Aqua for Balance, 2013). Lastly, psychological stress has also been shown to increase substance P levels, and research has shown that patients with FMS have two to three times the amount of substance P in the body than normal (Gupta & Sliman, 2004).

Stress Management

When it comes to stress, effective stress management is vital and helps the body manage and react to the stress it encounters in a healthy, efficient way. Countless numbers of different stress management techniques are available to help one manage stress. Some examples include relaxation techniques, time-management skills, exercise, and a healthy lifestyle. Various relaxation methods include yoga, biofeedback, tai chi, and muscle relaxation. Stress management is crucial for the body, as stress negatively affects the body and mind when it is overpowering and poorly managed (Stoppler, 2013).

Stress Management and Fibromyalgia

Very few studies have been conducted in which the effects of stress management on FMS symptoms have been analyzed, and some of the studies that have been completed are inconsistent in their findings. For example, Quintana & Rincon Fernandez (2011) examined self-reported quality of life, pain levels, and depression among women with FMS before and after an eight-week mindfulness training program. For women who completed the entire program, they had significant increases in quality of life and decreases in pain levels and depression. In contrast, Hammes, Mowinckel, Kjekken, and Hagen, (2012) analyzed the use of various self-management programs that incorporated stress management training, exercise activities, relaxation techniques, and time management skills. Results showed no significant difference in stress levels, pain, or symptoms between the patients who completed the treatment program and the control group.

Although there is a lack in consistent research with regard to stress management and FMS severity, an expert panel of psychologists have claimed that certain stress management techniques such as meditation, relaxation, yoga, biofeedback, exercise, and positive psychology, will significantly improve the severity of FMS-related psychological symptoms (Hassett, 2010).

Summary

Due to the strong connection between perceived stress levels and symptom severity in patients with FMS, the principal investigator is interested in looking further into that relationship, more specifically in adult women with FMS who reside in VA. Furthermore, it is well known that the use of stress management techniques is very important when it comes to decreasing and managing stress levels. Therefore, the principal investigator is also curious to study the effects of effective stress management, as perceived by the individual, on symptom severity in women with fibromyalgia. Although there is minimal literature available involving the effects of various stress management programs on symptom severity in FMS patients, the findings are inconsistent. The principal investigator hypothesizes that FMS patients with higher perceived stress management will have a lower severity of symptoms than those patients who do not perceive their stress management to be effective. Results from this research study will hopefully provide health care professionals with a greater understanding of how stress management affects FMS symptom severity and help FMS patients better understand the active role they play in their own health and well-being.

Chapter 3 - Methodology

Introduction

This research study was limited to adult women who suffer from fibromyalgia syndrome (FMS) and live within the state of Virginia. This chapter will discuss the methods that were used in order to analyze perceived stress, stress management, and symptom severity in women with fibromyalgia who participated in this study.

Sampling

IRB approval for this research study was approved by JMU in June 2013 (No. 14-0040). Participants for this study were recruited through several different means including family and friends, word of mouth, Facebook, FMS support groups, and chiropractic offices. An IRB approved flyer was placed in several chiropractic offices in Roanoke, VA and Harrisonburg, VA. Additionally, FMS support groups throughout VA were contacted and encouraged to participate. All participants were recruited via convenience sampling. However, a total of 34 individuals completed the online survey, so it is safe to assume normal distribution of data according to Central Limit Theorem (New York University, n.d.).

Instrumentation

Three different measurement instruments were utilized in this study in order to assess all three factors: Perceived stress levels, symptom severity, and perceived stress management. The Perceived Stress Scale (PSS) is a quantitative psychological assessment that was used in this study to measure the participants' perception of their own stress level (Cohen, 2013). This scale is a very popular psychological tool for measuring perceived stress and was chosen for this study because it is easy to use and free for public use (Cohen, 2013). The Fibromyalgia Impact Questionnaire (FIQ) is also a quantitative assessment that was used in this study to measure the effects of FMS on each participant (Burckhardt, Clark, & Bennett, 1991). The 2007 revised version of the FIQ was chosen

because it is simple to use, free for academic use, and measures the status of health areas that are most affected by FMS, including physical impairment, depression, anxiety, stiffness, fatigue, pain, ability to work, and overall feelings of well-being (Burckhardt et al., 1991). An original assessment of stress management, which was created by the principal investigator, was used to assess stress management both quantitatively and qualitatively. This instrument looked at stress management techniques used by the patient, how often the techniques were used, and how effective each patient perceived their techniques to be in managing their own stress.

Procedures

An anonymous online survey was created by the principal investigator via *Qualtrics*. The online survey included all three instruments mentioned above and collected responses from August 2013 to November 2013. Upon contacting the principal investigator via the email address provided on the flyers, potential participants received the online link to the survey through an online consent form, which was e-mailed directly to interested FMS individuals from the principal investigator.

Research Design

A quasi-experimental, mixed methods design was used, which included both qualitative and quantitative assessment measures looking at perceived stress levels, perceived effectiveness of stress management techniques, and severity of FMS symptoms.

Hypothesis

Fibromyalgia patients with better stress management skills (i.e., higher perceived stress management and greater use of stress management techniques) will have a lower severity of symptoms as measured by the FIQ than those patients who do not practice effective stress management.

Research Questions

-Are higher perceived levels of stress among FMS patients positively associated with greater

symptom severity, as determined by the FIQ?

-Do FMS patients with a higher perception of effective stress management have a decreased severity in symptoms, as determined by the FIQ?

-Do FMS patients that engage in more stress management techniques have a decrease in symptom severity, as determined by the FIQ?

Data Analysis

Results from the current study were analyzed using statistical t-tests, which identified statistically significant associations between factors. Cohen's d analyses were also performed to test for meaningful differences in the quantitative data. In addition, the principal investigator initially analyzed the qualitative data manually in order to find common themes, and the qualitative analysis program, *NVIVO*, was used to confirm and code the common themes within participants' responses.

Chapter 4 - Results

Introduction

Thirty-four participants responded to the online survey. Participant responses were divided into groups based upon their perceived stress scores and perceived stress management scores and analyzed via qualitative and quantitative methods. T-tests were used to compare symptom severity scores and perceived stress management effectiveness scores among the groups in order to determine any significant differences. Due to a small sample size, Cohen's d analyses were performed to help determine the meaningfulness of the differences. T-tests were performed by two members of the research team, and the same results were obtained by both individuals. Qualitative themes were identified among the written responses, which focused on stress management techniques used for each respondent, how often the techniques were used, which techniques were most effective, and which techniques were used to avoid stress. Using the Perceived Stress Scale's (PSS) mean and standard deviation norms and the PSS scores from this study, subjects were divided into three different groups dependent upon their perceived stress level (i.e., scores 10-20 = average stress level; 21-26 = above average stress level; and 27-33 = extremely above average stress level). In addition, participants were divided into three groups based on their perceived stress management effectiveness scores (score of 1 = not effective; 2 = neither effective nor ineffective; and 3 = effective).

Quantitative Results

Average scores for each symptom factor as well as perceived stress management effectiveness were calculated. Table 1 below shows the average scores for each factor measured among each stress cohort. All symptom factors reported were symptoms that each participant experienced within the past week of taking the survey. Physical impairment scores for each participant were calculated from 10 different questions assessing physical ability to engage in day-to-

day activities. Responses ranged from 0-3 (0 = always able; 1 = mostly; 2 = occasionally; 3 = never able to complete the task). All 10 responses were averaged for a mean physical impairment score for each person, which ranged from 0-3. Table 1 shows the mean physical impairment score for each stress group. “Days felt good” and “days missed” refer to the number of days each participant felt good and the number of days they missed events, school, or work because of FMS symptoms within the last week. Each additional FMS symptom score was collected using semantic differential scales that ranged from 0-4, assessing each of the symptoms (e.g., pain level, ability to do work, fatigue level, feelings of tiredness upon awakening, stiffness, anxiety, and depression), 0 representing the positive end of the scale, and 4 representing the negative, most severe end of the scale. These seven symptoms were averaged for each person to achieve an overall symptom score between 0-4. Perceived effectiveness of stress management techniques was measured on a scale from 0-4, (0 = very ineffective; 1 = ineffective; 2 = neither effective nor ineffective; 3 = effective; 4 = very effective). There were no responses of 0 or 4 by any participant.

Table 1. Average scores for each factor among the three different stress level groups.

Measured Variable	Perceived Stress Level - average (N=13)	Perceived Stress Level - above average (N=12)	Perceived Stress Level - extremely above average (N=9)
Physical Impairment	1.75 ($\sigma=.50$)	1.89 ($\sigma=.39$)	1.77 ($\sigma=.82$)
Days Felt Good	2.54 ($\sigma=1.85$)	1.58 ($\sigma=1.83$)	1.33 ($\sigma=1.12$)
Days Missed	1.92 ($\sigma=2.33$)	2.5 ($\sigma=2.07$)	3.44 ($\sigma=3.24$)
Ability to Work*	2.85 ($\sigma=.99$)	3.25 ($\sigma=.62$)	3.22 ($\sigma=1.39$)
Pain*	2.69 ($\sigma=1.03$)	2.67 ($\sigma=.65$)	3 ($\sigma=1.00$)
Fatigue*	3.23 ($\sigma=.73$)	3.5 ($\sigma=.80$)	3.78 ($\sigma=.44$)
Sleep Quality*	3.08 ($\sigma=1.12$)	2.67 ($\sigma=.98$)	3.33 ($\sigma=.87$)
Stiffness*	2.69 ($\sigma=1.11$)	3.25 ($\sigma=.75$)	3 ($\sigma=1.32$)
Anxiety*	1.77 ($\sigma=.93$)	2.58 ($\sigma=1.16$)	3.11 ($\sigma=.60$)
Depression*	1 ($\sigma=.71$)	1.92 ($\sigma=1.08$)	2.44 ($\sigma=1.74$)
Average Symptom Score*	2.47 ($\sigma=.43$)	2.83 ($\sigma=.37$)	3.13 ($\sigma=.50$)
Perceived Effectiveness of Stress Management	2.85 ($\sigma=.38$)	2.42 ($\sigma=.67$)	2.33 ($\sigma=.71$)

Table 2 below shows the average scores for each factor among each stress management effectiveness grouping. Number of stress management techniques used was determined by the number of techniques checked off from the 34 listed techniques within the survey. There was also an additional box for ‘other.’

Table 2. Average scores for each factor among the three different stress management effectiveness groups.

Measured Variable	Stress Management is Not Effective (N=2)	Stress Management is Neither Effective nor Ineffective (N=11)	Stress Management is Effective (N=21)
Physical Impairment	1.95 ($\sigma=.39$)	1.91 ($\sigma=.46$)	1.74 ($\sigma=.62$)
Days Felt Good	3.00 ($\sigma=2.83$)	1.09 ($\sigma=1.38$)	2.19 ($\sigma=1.72$)
Days Missed	1.00 ($\sigma=1.41$)	3.73 ($\sigma=2.53$)	2.05 ($\sigma=2.42$)
Ability to Work*	3.00 ($\sigma=1.41$)	3.36 ($\sigma=.67$)	2.95 ($\sigma=1.12$)
Pain*	3.50 ($\sigma=.71$)	2.64 ($\sigma=.81$)	2.76 ($\sigma=.94$)
Fatigue*	3.00 ($\sigma=0$)	3.82 ($\sigma=.40$)	3.33 ($\sigma=.80$)
Sleep Quality*	3.00 ($\sigma=1.41$)	3.18 ($\sigma=.75$)	2.90 ($\sigma=1.14$)
Stiffness*	3.50 ($\sigma=.71$)	3.00 ($\sigma=1.34$)	2.90 ($\sigma=.94$)
Anxiety*	1.50 ($\sigma=.71$)	3.09 ($\sigma=.83$)	2.14 ($\sigma=1.06$)
Depression*	3.00 ($\sigma=0$)	2.00 ($\sigma=1.26$)	1.43 ($\sigma=1.29$)
Average Symptom Score*	2.93 ($\sigma=.51$)	3.01 ($\sigma=.53$)	2.63 ($\sigma=.44$)
# of Stress Management Techniques used	15.00 ($\sigma=9.90$)	9.00 ($\sigma=4.27$)	15.52 ($\sigma=5.77$)

As shown in the averages in Table 1, the ‘number of days felt good’ within the last week decreased as the PSS scores increased. The number of days that events were missed increased as the PSS scores increased. Additionally, fatigue, anxiety, depression, and overall symptom scores increased as PSS scores increased between perceived stress level groups. According to Table 2, physical impairment, pain, and depression levels were higher in the group with perceived non-effectiveness of stress management than the other two groups (i.e., perceived effective and perceived neither effective nor ineffective). The ability to work scores also showed more difficulty in work ability among the perceived non-effective stress management group than the other two groups. Sleep quality scores show that those in the perceived non-effective and perceived neither effective nor ineffective groups awoke more tired and less rested than those in the perceived effective group.

The overall average symptom severity scores and stiffness levels were lower among the perceived effective stress management group than the other two cohorts.

T-tests results and p-values are shown in Table 3 and Table 4 below, along with statistically significant values for each cohort comparison.

Table 3. P-values for t-tests comparisons among each PSS score cohort.

Analysis Factor	T-test Comparison Groups					
	1V2	1V3	2V3	1&2V3	1&3V2	2&3V1
Physical Impairment	0.41	0.92	0.69	0.88	0.55	0.61
Days Felt Good	0.21	0.07	0.7	0.17	0.63	0.09
Days Missed	0.52	0.25	0.46	0.31	0.97	0.26
Ability to Work*	0.23	0.49	0.96	0.72	0.52	0.27
Pain*	0.94	0.49	0.39	0.41	0.69	0.73
Fatigue*	0.38	0.04	0.32	0.06	0.91	0.13
Sleep Quality*	0.33	0.55	0.12	0.22	0.33	0.74
Stiffness*	0.15	0.57	0.62	0.94	0.33	0.24
Anxiety*	0.06	0.0005	0.19	0.003	0.66	0.004
Depression*	0.02	0.04	0.43	0.13	0.58	0.003
Average Symptom Score*	0.03	0.005	0.16	0.02	0.67	0.003
Perceived Effectiveness of Stress Management	0.07	0.07	0.79	0.26	0.53	0.01

Group 1 is perceived normal stress level, group 2 is perceived above normal stress level, and group 3 is perceived extremely above normal stress level. Statistically significant p-values are listed in red, with alpha level of .05

Table 4. P-values for t-tests comparisons among each perceived stress management cohort.

Analysis Factor	T-test Comparison Groups					
	1V2	1V3	2V3	1&2V3	1&3V2	2&3V1
Physical Impairment	0.92	0.59	0.4	0.35	0.55	0.69
Days Felt Good	0.51	0.76	0.06	0.19	0.13	0.66
Days Missed	0.14	0.47	0.09	0.17	0.19	0.32
Ability to Work*	0.77	0.96	0.2	0.28	0.31	0.94
Pain*	0.29	0.35	0.69	0.98	0.66	0.34
Fatigue*	0.00005	0.06	0.02	0.11	0.052	0.0004
Sleep Quality*	0.89	0.93	0.42	0.46	0.53	1
Stiffness*	0.5	0.43	0.84	0.67	0.94	0.44
Anxiety*	0.14	0.39	0.01	0.06	0.04	0.27
Depression*	0.02	0.00001	0.24	0.11	0.51	0.000001
Average Symptom Score*	0.85	0.55	0.056	0.04	0.2	0.72
# of Stress Management Techniques Used	0.54	0.95	0.001	0.007	0.01	0.847

Group 1 is perceived non-effective stress management, group 2 is perceived neither effective nor ineffective stress management, and group 3 is perceived effective stress management. Statistically significant p-values are listed in red, with alpha level of .05

As shown in Tables 3 and 4, statistically significant p-values were found within several factors at the .05 alpha level. In Table 3, p-values < .05 were found between groups 1 and 3 for fatigue levels; between 1 and 3, 1&2 and 3, and 2&3 and 1 for anxiety levels; between 1 and 2, 1 and 3, and 2&3 and 1 for depression levels; between 1 and 2, 1 and 3, 1&2 and 3, 2&3 and 1 for overall symptom severity scores; and between 2&3 and 1 for perceived effectiveness of stress management. In Table 4, statistically significant p-values < .05 were found between groups 1 and 2 and 2 and 3 for fatigue levels; between 2 and 3 and 1&3 and 2 for anxiety levels; between 1 and 2, 1 and 3, and 2&3 and 1 for depression levels; between 1&2 and 3 for overall average symptom severity; and between 2 and 3, 1&2 and 3, and 1&3 and 2 for number of stress management techniques used.

Cohen's d analyses were performed in order to help estimate any true meaningful differences in the data. A Cohen's d analysis shows how many standard deviations of difference exists between two groups. D's between .1-.3 indicate a small difference between the groups, d's between .3-.5 indicate a medium difference between the groups, and d's greater than or equal to .5 indicate a large,

meaningful difference. The Cohen's *d* analyses showed *d*'s greater than .5 in all significant differences except for one, which was the comparison between the perceived effective stress management group and perceived non-effective stress management group in relation to their severity of depression.

Qualitative Results

Qualitative responses for each participant were recorded and themes were identified for stress management techniques used, most effective stress management techniques, and most effective ways to avoid stress. Table 5 below shows the top twenty most used stress management techniques among the sample, meaning at least 10 participants from the sample engaged in this technique regularly. As shown, the five most common stress management techniques used were spending time with loved ones, listening to music, reading, withdrawing from social activities, and spending time with pets. The most commonly used technique was spending time with loved ones, which was used by 73.5% of the respondents. Listening to music was reported as being the most effective stress management technique by 17.6% of the respondents.

Table 5. Number of respondents who engage in each stress management technique, reported most effective technique, and reported best method for avoiding stress.

Stress Management Technique	Use Technique	Say It Is Most Effective	Say It Is The Best Way To Avoid Stress
over/under eating	16	2	1
deep breathing	21	3	N/A
spending time with loved ones	25	3	N/A
withdrawing from social activities	22	1	8
engaging in hobby	16	2	N/A
exercising	15	2	N/A
procrastination	12	N/A	1
changing the situation	10	N/A	N/A
time management	15	2	5
being positive	19	N/A	N/A
sharing feelings with others	15	3	N/A
walking	11	4	N/A
listening to music	23	6	1
massage therapy	10	2	N/A
laughter	19	3	1
reading	23	3	2
meditation	10	5	N/A
prayer	14	4	N/A
spending time with pets	22	4	N/A
to-do lists	14	4	1

These techniques listed were the top 20 most used techniques within the sample.

There was a variety of responses for the ways in which participants avoided stress. The three most common ways included not overcommitting/ managing activities, staying home and not engaging in social activities, and avoiding stressful people and events. A total of 29.4% reported that avoiding stressful people and events was the most effective way to avoid stress. Common responses indicating this included “avoid ‘toxic’ people/stay away from toxic friends, avoid stressful people/events, avoid energy suckers, and stay away from negativity.” Furthermore, 58.8% of the respondents reported that they used stress management techniques each day. Everyone else in the sample reported using his or her techniques on a weekly basis, as needed.

Chapter 5 - Discussion and Results

Introduction

The purpose of this study was to analyze the relationships between perceived stress levels and symptom severity, as well as perceived stress management and symptom severity, in women diagnosed with Fibromyalgia Syndrome (FMS). Stress management techniques were examined in order to see which techniques were used more often and which techniques were most effective for FMS patients. This chapter will discuss important findings, study limitations, conclusions, and implications for further research.

Discussion

Research Question 1: Are higher perceived levels of stress among FMS patients positively associated with greater symptom severity, as determined by the FIQ?

Certain symptom severity factors showed a strong, positive association with higher perceived levels of stress. Fatigue, anxiety, depression, number of missed events in one week, and the overall mean symptom scores increased as perceived stress levels increased. In addition, as perceived stress scores increased, the number of days that patients felt good in a week decreased. Other factors such as physical impairment, ability to work, pain levels, sleep quality, and stiffness levels showed no associations with higher levels of perceived stress.

Significant and meaningful differences were found between several comparison groups among five different factors. Between the perceived normal stress group and the perceived above normal stress group, there were significant differences in depression levels and the combined mean symptom score. Between the perceived normal stress group and the perceived extremely above normal stress group, there were significant differences in fatigue, anxiety, and depression levels, as well as the combined mean symptom score. When combining the perceived normal and above normal stress groups in comparison to the perceived extremely above normal stress group, there

were significant differences in anxiety levels and the combined mean symptom score. When combining the perceived above normal stress group with the perceived extremely above normal stress group in comparison to the perceived normal stress group, there were significant differences in anxiety and depression levels, combined mean symptom scores, and perceived stress management effectiveness.

Increased symptom severity in FMS symptoms among the women in this sample further supports current literature that shows stress to be the greatest predicting factor for FMS symptom severity as well as a significant symptom aggravator in chronic conditions (Daniels et al., 2006; McEwen & Kalia, 2010; Murray et al., 2007; Stoppler, 2013). Results in the current study showed slightly higher perceived effective stress management among the cohort with perceived normal levels of stress. This finding could be because this specific group may realistically not have high levels of stress. Therefore, they believe their stress management techniques work well for them. On the contrary, this may also indicate that this group has a lower perceived level of stress if they do, in fact, engage in more effective stress management techniques.

Research Question 2: -Do FMS patients with a higher perception of effective stress management have a decreased severity in symptoms, as determined by the FIQ?

Certain symptom severity factors showed a strong, positive association with lower perceived levels of stress management. On the one hand, physical impairment scores, pain and depression levels, and difficulty in work ability were higher among the perceived non-effective stress management cohort. On the other hand, the combined mean symptom score and stiffness levels were much lower in the perceived effective stress management cohort. In addition, this same group reported a greater quality in sleep. Other factors, such as the number of days that patients felt good within a week and the number of events missed due to FMS symptoms, showed no significant associations with perceived effectiveness of stress management.

Once again, significant and meaningful differences were found between several different comparison groups among five different factors. Between the perceived effective stress management group and perceived neither effective nor ineffective stress management group, there were significant differences in fatigue and depression levels. Between the perceived neither effective nor ineffective stress management group and perceived effective stress management group, there were significant differences in fatigue and anxiety levels, as well as the number of stress management techniques used. When combining perceived ineffective and neither effective nor ineffective stress management cohorts in comparison to the perceived effective stress management group, there were significant differences in the number of stress management techniques used, as well as the combined mean symptom score. When combining the perceived ineffective and effective stress management cohorts in comparison to the perceived neither effective nor ineffective stress management group, there were significant differences in anxiety levels and the number of stress management techniques used. When combining the perceived neither effective nor ineffective and perceived effective stress management groups in comparison to the perceived ineffective stress management cohort, there were significant differences in depression levels.

Results from this study are similar to those of Quintana and Rincon Fernandez (2011), which found decreased pain and depression levels and increased life quality in FMS women who completed an eight-week stress reduction program. Consistency in these findings may suggest that effective stress management decreases disease symptoms due to lower stress levels in the body. Taken together, these findings may also suggest that the act of stress management itself empowers patients with a sense of control over their own well-being, which could potentially decrease depression and pain and increase overall quality of life. Greater sleep quality was positively associated with perceived effective stress management; however, current literature indicates another important factor in FMS patients that affects sleep quality. Theadom and Cropley (2008) found that

patients with flawed beliefs and attitudes about sleep and stress had a significant decrease in sleep quality and an increase in perceived stress. According to these findings, effective stress management may be unrealistic in decreasing stress and improving sleep quality for FMS patients who already have faulty beliefs about sleep and stress. Interestingly, results from the current study showed that those in the perceived neither effective nor ineffective stress management cohort use significantly fewer stress management techniques and have significantly higher levels of fatigue and anxiety than the other two cohorts. These findings may suggest that using a higher number of stress management techniques may increase overall effectiveness of stress management, in general. Although research is lacking in the area of stress management effectiveness for FMS symptoms, current literature and results from this study suggest that effective stress management can positively affect disease symptoms.

Qualitative Data

Results from the qualitative analysis showed a variety of stress management techniques that were used within this sample of female FMS patients, and many similarities did exist among the types of techniques used and in the beliefs about which techniques are most effective. The most common stress management techniques used were spending time with others and pets, reading, listening to music, and withdrawing from social activities. Seventy three point five percent of the sample spent time with loved ones in order to manage their stress. The most common stress management technique that was reported as the most effective was listening to music. In addition, 29.4% of the sample reported that the best way to avoid stress was to avoid stressful or negative people and/or events. Over half of the sample (58.8%) engaged in stress management techniques on a daily basis, which is very close to the 61.7% of the sample who reported having either above normal or extremely above normal levels of stress. These findings may suggest that patients with perceived normal stress levels engage in stress management techniques less often or as needed.

Given that avoiding stressful people/situations was reported as being the most effective way to avoid stress, and withdrawing from social activities was a common technique used in the current study, it is likely that solitary stress management activities may be the most beneficial for some patients with FMS.

Study Limitations

While the current study confirms previous research (e.g., Daniels et al., 2006; McEwen & Kalia, 2010; Murray et al., 2007; Stoppler, 2013; Quintana & Rincon, 2011), there are several limitations that should be identified. First, the current sample size was small, which limits the generalizability of the findings. A larger sample size would have yielded results that are more representative of the overall FMS population. Due to the small sample size of this study, these findings may not be generalizable to the larger population of all women with FMS. Therefore, it would be ideal to conduct additional research studies on the effects of stress management in FMS patients using a much larger sample. Second, the sample consisted of female FMS sufferers, which limits the generalizability of the findings to male FMS patients. Therefore, additional studies that include a gender-stratified sample can more effectively compare and contrast gender differences. Finally, in responding to the survey questions, respondents may have misunderstood a question or scale and marked answers that were misrepresentative of what is true for their health condition, which impacts the response bias on behalf of participants.

Conclusions

Results from this study support the stated research questions and current literature regarding the relationship between higher levels of stress and FMS symptom severity. In addition, according to the results of the current study, effective stress management, as perceived by the individual, may have a significant impact on the severity of certain FMS symptom factors. All FMS symptom factors examined in this study were significantly associated with either perceived stress levels or perceived

stress management effectiveness. Higher levels of depression and higher combined mean symptom scores were associated with both higher levels of perceived stress and lower effectiveness of stress management techniques, as perceived by the individual. Interestingly, perceived stress levels affected fatigue, anxiety, missed events, and 'days felt good', while perceived stress management effectiveness affected physical impairment, pain, work ability, stiffness, and sleep quality.

Ironically, the most common stress management technique used was spending time with others, while the most common reported best way to avoid stress was to not engage in social activities and avoid stressful people. Furthermore, 79.4% reported feelings of depression within the last week of taking the survey. Given that severity of depression was strongly associated with both perceived stress levels and perceived effective stress management, it is important to note that women with depression tend to avoid stressful conflict and use friends to self-medicate (Segal & Segal, 2014). The common stress management trends seen in this study may perhaps be a result of the high presence of depression among the women in the current sample. In addition, not engaging in social activities and staying at home, which was reported as the best way to avoid stress and also one of the top five most commonly used techniques, may also be a key factor leading to feelings of depression among the women in this sample.

Given that it was commonly reported that negative and stressful people and situations were avoided in order to avoid stress, it may be beneficial for FMS patients to develop better, more effective communications skills for conflict management. Learning how to deal with stressful issues in healthier ways instead of avoiding them may be helpful in managing stress and related FMS symptoms. Additionally, listening to music was reported as the most effective stress management technique. Therefore, it may be helpful for FMS patients to listen to music regularly and experiment with the types of music that are most effective in relieving their stress.

Suggestions for Further Research

Several suggestions for future research are derived from the current study. For instance, it would be interesting to conduct an intervention study to test the various symptom effects of different stress management techniques on FMS patients using a longitudinal study design. Moreover, given that depression was a significant symptom factor within the current study in terms of stress management and stress levels, it would be important to further study the relationship that depression has on FMS symptoms and how stress management affects the severity of depression. In addition, music was reported as the most effective stress management technique. Therefore, it would be intriguing to study the effects of the different types of music on stress levels and FMS symptoms.

Brief Concluding/Summarizing Remark

Results from the current study support the findings that perceived stress levels do significantly impact FMS symptom severity among patients. Although patients may not be able to directly affect their FMS symptoms, these results are promising for FMS patients who may, in fact, be able to indirectly affect their symptoms through effective stress management. FMS patients who are depressed should seek treatment for their depression, because this condition may significantly affect the overall severity of FMS symptoms. Fibromyalgia patients should be encouraged to focus on healthy and effective stress management techniques to find out what works best for each individual, as doing so may help reduce the overall severity of FMS symptoms.

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