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Self-Efficacy for Adoption and Maintenance of Exercise Among Fibromyalgia Patients: A Pilot Study

Abstract: Objective. *While multimodal treatment approaches for fibromyalgia (FM), incorporating exercise, have been found most effective, information about factors associated with exercise adoption and maintenance is lacking.* Design, Setting, and Methods. *Women veterans with FM (N = 19) completed an anonymous Internet survey measuring FM impact (FI), adoption of exercise behavior, and self-efficacy for exercise. Using classifications of behavior specified by the transtheoretical model, the self-efficacy of participants classified in the action or maintenance (AM) stages was compared with those in earlier stages (precontemplation through preparation) of exercise readiness. Multivariate analysis of variance analyses examined differences in FI domains by stage of change. Analysis of covariance examined whether exercise self-efficacy differed by stage of change while controlling for FI.* Results. *Higher*

levels of self-efficacy were detected among participants in the AM stages. Participants in the AM stages also reported higher levels of FI symptoms. After controlling for FI, self-efficacy did not differ significantly between the 2 groups; however the effect size was large ($\eta^2 = .11$). Conclusions. *Findings of this pilot study suggest a role for self-efficacy in exercise adoption and*

... among veterans, recent research suggests women are more likely than men to report FM [fibromyalgia]

maintenance, even in the setting of higher FM symptoms. Replication of this study with a larger sample size is warranted.

Keywords: fibromyalgia; veterans; exercise; self-efficacy; transtheoretical model; self-determination theory

Fibromyalgia (FM) is a chronic disease characterized by widespread pain.^{1,2} Additional symptoms include waking unrefreshed, disturbed cognition, and fatigue.² The prevalence of FM in the general population has been estimated to be between 0.5% and 5%.³ Recent work has found that FM affects 3.4% of US women and 0.5% of US men.^{4,5} It

follows that individuals suffering from FM have significantly higher levels of health care utilization and associated costs when compared with patients without FM.⁶ Specifically, in 1 year, mean health care costs for FM patients were 3 times higher than the comparison group.

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According to previous research, chronic pain conditions among women are higher than for men in the civilian population.⁷ Of direct relevance to the current study, among veterans, recent research suggests women are more likely than men to report FM.^{8,9} Furthermore, evidence suggests that women veterans with pain utilize more VHA (Veterans Health Administration) care and they are 37% less satisfied with that care.¹⁰ Notably, while they are accessing more VA care, they report greater barriers to such care and often seek services in the community. As women veterans represent the fastest growing segment of VHA utilizers, it will be important to understand their needs to develop and to provide appropriate, patient-centered care whether in VHA or in the community.

Exercise to Improve FM Symptoms

There are a variety of treatments available for FM including pharmacological and nonpharmacological options; however, a meta-analysis demonstrated that pharmacological treatments were less effective than nonpharmacologic treatments.¹¹ Nonpharmacologic treatments include exercise, physical therapy, and cognitive behavioral therapy.¹² Several clinical trials have shown that exercise is effective for FM. Supervised exercise can improve symptom severity, physical function, and overall well-being.¹³⁻¹⁵ Exercise also has positive long-term effects on FM symptoms. In a randomized treatment study, comparing aerobic exercise to stress management treatment and treatment as usual, aerobic exercise was the most effective treatment overall, with participants reporting less pain and depression than those who did not exercise at 4-year follow-up.¹⁶

While the benefits of exercise in persons with FM have been well established, exercise interventions demonstrate poor adherence and retention rates.¹⁶⁻¹⁸ Furthermore, as exercise adherence declines, FM symptoms worsen.¹⁶ Factors that motivate or deter those with FM from

maintaining an exercise program are poorly understood. *For persons with FM to sustain and benefit from exercise, studies are needed to examine predictors of exercise adoption and maintenance in this population.*

In this study, we sought to understand how the degree of fibromyalgia impact (FI), a primary interference characteristic of FM, is associated with exercise self-efficacy within the transtheoretical model (TTM).¹⁹ This examination may ultimately pinpoint factors that interfere with initiating exercise and/or achieving long-term exercise maintenance in persons seeking treatment for FM. This examination can also help identify points of clinical intervention. To our knowledge, no previous studies have examined the association between FI and exercise self-efficacy across the TTM stages of change among female veterans diagnosed with FM. Thus, this study explored these variables in relation to one another without prespecified hypotheses. In particular, we were interested in examining the following questions:

1. Consistent with the general population, do FM patients in the active stages of change (Action and Maintenance) have higher exercise self-efficacy as compared with patients in the nonactive (Precontemplation through Preparation) stages of exercise behavior change?
2. Are the FI domains higher or lower in the active stages of change as compared with the nonactive stages of change?
3. Does the degree of FI affect observed differences in self-efficacy levels between the active stages of change compared with the nonactive stages of change (ie, will there be differences between the 2 groups in self-efficacy levels after controlling for FI)?

Method

Recruitment

We recruited women veterans who were enrolled in primary care at one

Department of Veterans Affairs (VA) Medical Center. Eligible participants had a diagnosis of FM (ICD-9) documented in their medical records and were psychiatrically stable.

Procedures

After an initial phone screen, eligible participants were invited to participate in a focus group session scheduled at 1 of 2 campuses of the VA Boston Healthcare System. Participants provided informed consent before participating in a 1-hour focus group aimed to identify preferences and barriers to treatment of FM in primary care. The overall purpose of the focus groups was to ascertain experiences and preferences for VHA pain care. During the focus group, patients described their experiences with pain treatment at their facility and their preferences for future care.

Once the focus group was completed, each participant was given a handout with an Internet link and research code to an anonymous survey through PsychData, LLC. The Internet survey examined individuals' readiness to adopt and implement regular exercise behavior. It also assessed psychosocial sequelae associated with experiencing chronic pain (eg, overall FI, interference in functioning, and quality of life). We asked participants to complete the online survey within 1 week of their participation in the focus group. Participants who completed all study procedures received \$50 compensation. All study procedures were reviewed and approved by the institutional review board at the VA Boston Healthcare System. Twenty out of the 22 participants who participated in the focus groups completed the online survey. There was missing data on a single participant bringing the total sample size to 19.

Measures

The TTM Stages of Change Measure for Exercise. This continuous measure categorizes individuals as being in 1 of the following 5 stages of change with respect to exercise: precontemplation, contemplation, preparation, action, or maintenance.²⁰ Stages are mutually

exclusive, and each participant can be placed into only 1 stage, represented as 1 (precontemplation) to 5 (maintenance). Exercise maintenance is defined as having exercised regularly for at least 6 months. This measure has demonstrated strong reliability and validity.²¹⁻²⁴ An example item from this measure is, “Do you currently engage in regular exercise (at least 4 times per week for 30 or more minutes per session)?”

Self-Efficacy. Self-efficacy is considered a primary factor in starting a new behavior such as exercise²⁵ and is positively correlated with progression toward active stages of change (ie, action and maintenance).²⁶ Self-efficacy was measured using a scale that has been validated using a TTM²⁷ construct to determine readiness for exercise.

Fibromyalgia Impact Questionnaire Revised. The primary outcome measure was the Total Score from the Fibromyalgia Impact Questionnaire Revised (FIQR).²⁸ The FIQR has been found to be a useful brief instrument to assess the overall impact and severity of FM. The FIQR is an updated version of the widely used Fibromyalgia Impact Questionnaire (FIQ), which has been extensively used and validated in clinical trials. The FIQR consists of 21 items that assess pain, fatigue, stiffness, sleep, depression, memory, anxiety, balance, and environment sensitivity. All items are framed in the past 7 days and are scored on an 11-point numeric rating scores of 0 to 10, with 10 being “worst.” The total score ranges from 0 to 100, with higher scores representing greater symptom burden and functional limitations from FM. The FIQR has strong internal consistency (Cronbach’s $\alpha = .79$ to $.93$) and is comparable to the original FIQ allowing comparisons between the FIQ and FIQR. In addition to the Total Score, the FIQR contains scales for Symptoms (10 items), Function (9 items), and Overall Impact (2 items)—the most important domains in FM trials. Scoring of the FIQR involves (1) summing the score for function (range 0 to 90) and dividing by 3; (2) summing the score for

overall impact (range 0 to 20); and (3) summing the score for symptoms (range 0 to 100) and dividing by 2. The 3 domains are weighted; 30% of total score ascribed to function, 50% to symptoms, and 20% for overall impact.

Analytic Plan

Descriptive statistics were calculated on all study variables. An independent samples *t* test was conducted to compare the self-efficacy of participants in the action and maintenance stages to those in the earlier stages of exercise behavior change to determine whether FM patients in the active stages would have higher self-efficacy, as has been found in the general population. A separate multivariate analysis of variance (MANOVA) was conducted to examine differences between participants in the 2 stages of exercise behavior change groups (Precontemplation through Preparation [PC-prep] vs AM) on the FI domains (function, overall impact, symptoms), as well as the total FI score. Finally, an analysis of covariance (ANCOVA) was conducted to examine whether exercise self-efficacy was greater in the action and maintenance stages as compared with earlier stages of change after taking into account the degree of FI, which was entered as a covariate. Given the small size of this pilot sample, partial η^2 values were reported with each *F* value in order to better estimate the strength of each finding, which were interpreted based on established guidelines: $.01 =$ small; $.06 =$ medium; $.13 =$ large.²⁹

Results

Participants

Twenty female veterans completed an Internet-based survey. Participants ranged in age from 30 to 76 years old, with mean age of 50.6 years. The majority of the sample was White (54.5%), college educated (72.7%), unemployed (77.3%), divorced/unmarried (54.5%), and resided in a private home/apartment/condominium (90.9%). The mean of the overall degree of FI was 74.7/100 (standard deviation [SD] = 17.6). Common comorbid

diagnoses included posttraumatic stress disorder (72.7%) and depression (27.3%). Across the stages of exercise behavior change, 70% ($n = 14$) of the participants were classified in the PC-prep stages while 30% ($n = 5$) of participants were classified in the AM stages. For further descriptive information, see Tables 1 and 2.

1. A marginally significant difference in self-efficacy was found between participants in the action and maintenance stages (mean [*M*] = 51.40; SD = 9.45) as compared with those in earlier stages of exercise behavior change (*M* = 38.64; SD = 17.15), $t(13) = -2.05$, $P = .06$, Cohen’s $d = .92$. This difference was in the expected direction and represented a potentially large effect.
2. The overall MANOVA comparing participants in the action and maintenance stages with those in the earlier stages of exercise behavior changes on the composite scale of the 3 FIQR domains (function, overall impact, and symptoms) as well as the total score was marginally significant, $F(3, 15) = 2.57$, $P = .09$, $\eta^2 = .34$, representing a potentially large effect. As the effect was relatively large and the omnibus test reached marginal significance ($P < .10$), we conducted follow-up analyses of variance (ANOVAs) examining each individual FIQR domain as well as the total score, separately. The FIQR symptoms domain was the only domain that was significantly different across the stages for exercise, $F(1, 17) = 4.80$, $P < .05$, $\eta^2 = .22$, with participants in the action and maintenance stages (*M* = 44.9; SD = 6.22) reporting higher symptoms than those in the earlier stages of exercise behavior change (*M* = 36.0; SD = 8.22). We compared Fibromyalgia Impact Domains by Exercise Stage of Change (see Tables 3 and 4).
3. The ANCOVA conducted to determine whether self-efficacy for participants in the action and

Table 1.
Demographics.

	Percentage (Frequency)
Full-time	18.2 (4)
Part-time	4.5 (1)
Unemployed	77.3 (17)
High school	13.6 (3)
College	72.7 (16)
Graduate school	13.6 (3)
White/Caucasian	54.5 (12)
Black/African American	31.8 (7)
Hispanic/Latino	4.5 (1)
Native American	4.5 (1)
Other	4.5 (1)
Married	27.3 (6)
Significant other	13.6 (3)
Divorced	31.8 (7)
Separated	4.5 (1)
Never married/ single	22.7 (5)
Private home/ apartment/condo	90.9 (20)
Private room/ rooming house	4.5 (1)
Other	4.5 (1)
Alone	27.3 (6)
With spouse	36.4 (8)
With family members	36.4 (8)

maintenance stages was significantly higher than those in the earlier stages of exercise behavior change after controlling for the degree of FI was not significant, $F(1, 16) = 2.02, P = .17, \eta^2 = .11$.

Table 2.
Fibromyalgia and Other Diagnoses.

	Percentage (Frequency)
Fibromyalgia	
Yes	100.0 (22)
No	0.00 (0)
PTSD	
Yes	72.7 (16)
No	27.3 (6)
Other diagnoses	
None	45.5 (10)
Depression	27.3 (6)
Anxiety	9.1 (2)
Anxiety and depression	9.1 (2)
Other	9.1 (2)
Exercise stage of change	
Pre-action (PC-prep)	73.7 (14)
AM	26.3 (5)
Mean (SD)	
Self-efficacy by exercise stage of change	
Pre-action (PC-prep)	38.64 (17.15)
AM	51.40 (9.44)

Abbreviations: PTSD, posttraumatic stress disorder; PC-prep, Precontemplation through Preparation stage; AM, Action or Maintenance stage.

Discussion

The current study provides preliminary findings regarding the relationship between the degree of FI, self-efficacy, and exercise stages of change among a sample of female veterans with FM. We found that women who exercised regularly reported higher FM symptoms. One explanation is that exercise may exacerbate FM symptoms. Another reason for this finding is that women with more symptoms may have stronger

motivation to exercise regularly. Therefore, exercise programs must be tailored to the individual and progressively advanced as the patient becomes better conditioned to mitigate the potential exacerbation of FM symptoms.

Our pilot study found effect sizes that are potentially medium to large sized, which holds promise and suggests that even when participants have a high degree of FI, they can still achieve exercise action and maintenance as long as they have high self-efficacy for exercise. However, future studies with better power are required to determine more precise effect sizes. Nevertheless, our effect sizes are promising as a first investigation.

To our knowledge, this is the first study to investigate how self-efficacy may serve to predict the action and maintenance stages of exercise behavior change, regardless of the degree of FI, in this specific chronic pain population. Additionally, these findings are supported by empirical evidence of the self-efficacy construct predicting exercise stages of change in the general population.³⁰ Our preliminary findings highlight the need for further research examining self-efficacy and variants of exercise motivation, such as those found in self-determination theory—which has been found to integrate well with the TTM stages of exercise behavior change and can capture individuals' internal motivations to adopting and sustaining exercise.³¹ Investigating such variables in relation to FI, among the FM population, will be a significant contribution to inform intervention development aimed at helping individuals suffering from FM to initiate and sustain regular exercise.

In sum, these results point toward the potential importance of developing effective interventions aimed at helping individuals with FM develop greater self-efficacy for exercise regardless of the degree FM is affecting their life. Future work, with larger sample sizes, is needed to replicate and extend this work to intervention studies.

Table 3.

Fibromyalgia Impact Domains and Stages of Exercise Behavior.

	PC-Prep (n = 14), Mean (SD)	AM (n = 5), Mean (SD)
Fibromyalgia function	20.86 (6.06)	20.93 (4.66)
Overall impact of fibromyalgia	14.36 (5.94)	18.60 (3.29)
Fibromyalgia symptoms	36.00 (8.22)	44.90 (6.22)
Total fibromyalgia impact	71.21 (18.08)	84.43 (13.01)

Abbreviations: PC-prep, Precontemplation through Preparation stage; AM, Action or Maintenance stage.

Table 4.

Follow-up ANOVA Results Comparing Fibromyalgia Impact Domains by Exercise Stage of Change.

	Follow-up ANOVA Result			
	F	η^2	P	df
Function	0.001	.00	.98	1, 17
Overall impact	2.24	.12	.15	1, 17
Symptoms	4.80*	.23	.04	1, 17
Total	2.22	.12	.15	1, 17

Abbreviation: df, degree of freedom.

*Significant at $P < .05$.

Limitations

The small sample size of this pilot study likely led to the nonstatistically significant results even with the large effect sizes noted. Studies with small sample sizes have a number of limitations and may lead to spurious associations among variables. While these results may not be generalizable to men and other samples of patients with FM, this is the first study of FI and self-efficacy for women veterans with FM. The replication of this study with a large sample size will help assess the nature of the relationships between FI, exercise self-efficacy, and stages of change. Other areas to explore could include associations with posttraumatic stress severity, depression, and anxiety in order

to better determine subpopulations of individuals with FM who may be most vulnerable to remaining sedentary and thus most appropriate for targeted interventions to increase readiness for adopting and maintaining regular exercise.

Conclusion

FM is a disabling condition that disproportionately affects women veterans and has a high personal and societal cost. In this unique study of exercise motivation among women veterans, we found a strong relationship between self-efficacy and exercise stages of change, regardless of the high degree of FI. These findings suggest that

self-efficacy may be an important intervention point for programs that treat women with FM. Future studies should focus on larger sample sizes that control for relevant variables in order to inform development of tailored, clinical interventions in primary care and chronic pain treatment settings.

Authors' Note

The views expressed in this article are those of the authors and do not necessarily represent the position or policy of the Department of Veterans Affairs.

Declaration of Conflicting Interests

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Ethical Approval

This is human subjects research. We received IRB approval to conduct the study.

Informed Consent

This is human subjects research, we used an IRB approved consent form for this study.

Trial Registration

Not applicable, because this article does not contain any clinical trials. [AJLM](#)

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