# Analysis of Variance in Fibromyalgia Symptom Severity Related to Demographic Variables

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## Abstract:

**Objectives:** The purpose of this study was to attempt to identify demographic risk factors for increased symptom severity among patients with fibromyalgia syndrome [FMS].

**Methods:** This study involved a cross-sectional Internet-based survey of adults diagnosed with FMS.

**Results:** Analyses of variance revealed that symptom severity was associated with age, employment status, household income level, and level of educational attainment.

**Conclusions:** This study has identified four variables that are predictive of FMS clinical severity. It is proposed that demographic variables be assessed as a component of future management strategies.

**Keywords:** Fibromyalgia syndrome | symptom severity | patient demographics

## Article:

### INTRODUCTION

The purpose of this study was to attempt to identify demographic risk factors for increased symptom severity among patients with fibromyalgia syndrome [FMS]. Fibromyalgia syndrome is a disorder characterized by widespread pain at specific points throughout the body (1,2,3). The typical FMS patient experiences a combination of a number of symptoms: chronic pain in all quadrants of the body not related to an inflammatory process, cold fingers and feet, impaired memory, frequency and sensation of needing to urinate, depression [not necessarily clinical], sleep and balance disturbances, muscle twitching and aches, painful, dry mouth, headaches, and

sore throat (4). For a diagnosis of FMS, tender points are determined by a physician palpating with an approximate force of 4 kg of pressure, eliciting a painful response from the patient in at least 11 of 18 specific areas throughout the body (3).

The FMS has been associated with a number of demographic factors. The disorder is found in all socioeconomic levels and most countries and ethnic groups (4,5). The worldwide incidence of FMS appears to be between one percent and 12 percent of the population, although diagnostic criteria vary from country to country (5). Three to six million individuals in the United States have been diagnosed with FMS (2). Most patients range in age from 20-50 years when diagnosed (5). However, people of all ages can be diagnosed, including children (6). Women are five to 20 times more susceptible to acquiring FMS as compared to men (5). The prevalence among women increases as they age and may exceed 10 percent of the population of women between the ages of 50-60 years (7). Twenty-six to fifty percent of FMS patients report a history of FMS in family members (5, 8). These findings indicate that certain populations [e.g., Caucasians, women, and those with a family history of FMS] may be more likely to develop FMS. However, they do not provide information as to which demo- graphic characteristics are associated with greater symptom severity once FMS has been diagnosed.

A limited amount of previous research has been done examining influences on symptom severity among patients diagnosed with FMS. For example, Burckhardt, Clark, and Bennett (9) and Cronan, Serber, Walen, and Jaffe (10) both found a relationship between age and the severity of FMS symptoms, with younger patients experiencing more severe symptoms. In addition, we have found that greater symptom severity is associated with higher levels of perceived stress and lower levels of family relationship functioning [unpublished observations]. The present study aims to add to these existing findings by analyzing the variance in symptom severity based on several demo- graphic variables among FMS patients.

## MATERIALS AND METHODS

This study involved a cross-sectional Inter- net-based survey of adults diagnosed with FMS. Participants were recruited through contacts with Internet web-sites, chat rooms, and list-serves that serve individuals with FMS. Following approval by the administrators of these services, the second author posted invitations to participate in the survey on these sites and list-serves. Participants were required to verify that they had been diagnosed with FMS by a medical doctor or osteopathic physician prior to accessing the survey. The survey was hosted by a Web-based survey company, and participants had the option to either complete and submit the entire survey on-line or down- load the survey and return it via postal mail. Responses to the survey were anonymous. The Institutional Review Board of the university where the research was conducted approved this study.

The instrumentation included in this survey included a demographic questionnaire and the Fibromyalgia Impact Questionnaire [FIQ]. The demographic questionnaire gathered information about each participant's age, gender, ethnic background, employment status, income, education level, sexual orientation, relationship status, number of biological offspring, number of siblings, birth order, religion, type of symptom onset [gradual or rapid], age of onset of FMS, the length

of time that symptoms have been experienced, and whether the participant has ever received professional mental health treatment.

Burckhardt, Clark, and Bennett (11) developed the FIQ, which contains 20 items assessing the current [past seven days] physical, psychological, social, and global health status of patients with FMS. The first 10 items require respondents to rate their ability to perform large-muscle group tasks [e.g., shopping, laundry, food preparation, etc.] on a Likert scale. The twelfth item requests information regarding number of days within the past week that the participant "felt good." The thirteenth item requests information about the number of days of missed work within the past week. The final seven items ask the participant to rate various symptoms [i.e., ability to work, pain, fatigue, morning tiredness, stiffness, anxiety, and depression] using a 100 mm visual analog scale. Only these final seven items were used in the present study. A subscale consisting of these items was generated to obtain a symptom severity subscale score. Each of these items was weighted equally, and the mean value of these seven items was used as the symptom severity score. This subscale yielded an overall Chronbach's alpha coefficient of $\alpha = 0.79$, suggesting good internal consistency, thus justifying the use of this subscale score as an indication of symptom severity.

One-way analyses of variance [ANOVA] were conducted to analyze the following re- search question: Are there differences in participants' symptom severity subscale scores based on the following demographic variables: age, gender, ethnic background, employment status, income, education level, sexual orientation, relationship status, number of biological offspring, number of siblings, birth order, religion, type of symptom onset [gradual or rapid], age of onset of FMS, the length of time that symptoms have been experienced, and whether the participant has ever received professional mental health treatment? One-way ANOVA is the appropriate statistical tool for this analysis because of its ability to detect whether group means differ from one another (12).

## RESULTS

In all, 288 participants accessed the Inter- net-based survey. This number includes individuals who accessed the site but did not complete the survey. The company that hosted the survey tracks all people who access the site and respond to at least one item [including the in- formed consent document, to which each participant was required to respond in order to access the remainder of the survey]. A decision rule was designed to eliminate from the analyses those respondents for whom more than 10 percent of the data were missing [Figure 1]. The decision rule resulted in the elimination of 78 [27 percent] participants, yielding 201 usable data sets. Table 1 describes the demographic characteristics of the participants.

For three of the demographic variables [age, years of experiencing symptoms, and age of onset], data were originally collected as continuous variables. For each of these variables, three categories were developed in which the middle group contained all individuals within one standard deviation from the mean, and the low and high groups contained individuals whose scores fell above and below one standard deviation from the mean, respectively. In their continuous form, two of these variables showed normal distribution as evidenced by analyses of skewness and kurtosis [skew statistic/standard error of skew statistic; kurtosis statistic/standard

error of skew statistic]: age [-0.14; 2.70] and age of onset [-2.07; -1.29]. The variable, years of experiencing symptoms, showed a positive skew and kurtosis [9.81; 7.22]. However, all three variables were categorized using standard deviations as indicated above in order to maintain consistency in the meaning of the categories. Table 1 delineates the categorical groupings of these three variables. Scores on the symptom severity subscale of the FIQ ranged from 15 to 70. The overall mean for all participants was 49.96 [SD = 11.60].
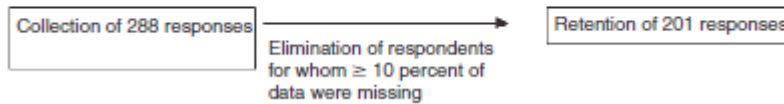
## FIGURE 1. Decision Tree



TABLE 1. Frequencies and Percentages of Participants' Demographic Characteristics

| Variable | N | % | Variable | N | % |
|---|---|---|---|---|---|
| Age * | | | Sexual Orientation * | | |
| 0 to 36 | 32 | 15.9 | Heterosexual | 153 | 76.1 |
| 37 to 57 | 140 | 69.7 | Gay/Lesbian/Bisexual | 12 | 6 |
| 58 and older | 27 | 13.4 | Relationship Status * | | |
| Gender * | | | Married | 137 | 68.2 |
| Female | 169 | 84.1 | In relationship, not married | 33 | 16.4 |
| Male | 31 | 15.4 | Single | 30 | 14.9 |
| Ethnic Background * | | | Type of Symptom Onset | | |
| Caucasian | 196 | 97.5 | Gradual | 128 | 63.7 |
| Other | 4 | 2.0 | Rapid | 73 | 36.3 |
| Employment Status * | | | Received mental health treatment * | | |
| Employed | 71 | 35.3 | Yes | 141 | 70.1 |
| Non-employed | 129 | 64.2 | No | 55 | 27.4 |
| Years of Symptoms * | | | Number of biological offspring * | | |
| 0 to 2 | 13 | 6.5 | 0 | 62 | 30.8 |
| 3 to 30 | 164 | 81.6 | 1 | 32 | 15.9 |
| 31 or more | 22 | 10.9 | 2 | 51 | 25.4 |
| Age of Onset * | | | 3+ | 53 | 26.4 |
| 0 to 17 | 33 | 16.4 | Number of siblings * | | |
| 18 to 45 | 135 | 67.2 | 0 | 26 | 12.9 |
| 46 and older | 30 | 14.9 | 1 | 67 | 33.3 |
| Annual Household Income * | | | 2 | 51 | 25.4 |
| $0 to 29,000 | 61 | 30.3 | 3+ | 56 | 27.9 |
| $30,000 to 59,000 | 70 | 34.8 | Birth Order * | | |
| $60,000 and over | 64 | 31.8 | Firstborn and Only Children | 91 | 45.3 |
| Education Level * | | | Middle of ≥ 3 Siblings | 45 | 22.4 |
| ≤12 years | 21 | 10.4 | Last Born [≥ 2 Siblings] | 53 | 26.4 |
| 13 to 14 years | 49 | 24.4 | Religious Orientation * | | |
| 15 to 16 years | 62 | 30.8 | Catholic | 31 | 15.4 |
| 17+ years | 53 | 26.4 | Jewish | 9 | 4.5 |
| | | | Protestant | 106 | 52.7 |
| | | | Other Religious Orientation | 41 | 20.4 |

* Data were unavailable for some respondents for this variable.

A series of one-way analyses of variance was conducted to identify significant differences in symptom severity subscale scores among groups based on the various demo- graphic variables.

These analyses revealed that participants' symptom severity subscale scores differed significantly based on the following four demographic characteristics: age [F = 4.04, df = 2, P = 0.02], employment status [F = 8.27, df = 1, P = 0.004], income level [F = 4.27, df = 2, P = 0.02], and education level [F = 4.54, df = 3, P = 0.004].

For these significant differences, post hoc Tukey "honestly significant difference" analyses were conducted to determine which groups differed significantly from one another. The following differences were significant at the P :s 0.05 level. Regarding age, participants aged 58 and older had significantly lower symptom severity scores [M = 44.89, SD = 14.79] as compared with those between the ages of 37 and 57 [M = 51.45, SD = 10.62, P = 0.017]. Regarding employment status, participants who were employed indicated significantly lower symptom severity scores [M = 46.87, SD = 11.25] compared with participants who were not employed [M = 51.72, SD = 11.50, P = 0.004]. Regarding income, participants with annual household income levels of greater than or equal to $60,000 reported significantly lower symptom severity scores [M = 46.78, SD = 10.69] compared with participants reporting incomes of less than or equal to $29,000 [M = 52.62, SD = 12.14, P = 0.012]. Regarding education level, participants reporting the highest levels of educational attainment [> 17 years] had significantly lower symptom severity scores [M = 46.30, SD = 9.30] as compared with participants reporting the lowest levels of educational attainment [:s 12 years; M = 56.71, SD = 13.14, P = 0.003]. Figure 2 illustrates the differences between these groups.

Participants' symptom severity subscale scores did not differ significantly based on these other demographic variables: gender [F = 1.03, df = 1, P = 0.31], sexual orientation [F = 1.12, df = 1, P = 0.29], relationship status [F = 1.51, df = 2, P = 0.22], number of children [F = 0.50, df = 3, P = 0.68], number of siblings [F = 1.74, df = 3, P = 0.53], birth order [F = 0.06, df = 2, P = 0.95], ethnic background [F = 0.66, df = 1, P = 0.42], religious orientation [F = 0.39, df = 3, P = 0.76], years of experiencing FMS symp- toms [F = 0.17, df = 2, P = 0.84], type of FMS onset [F = 0.18, df = 1, P = 0.68], age of onset [F = 1.88, df = 2, P = 0.16], and whether the par- ticipant had ever received mental health treat- ment [F = 0.04, df = 1, P = 0.84].

FIGURE 2. Symptom Severity Scores Based on Demographic Variables: Significant Differences Between Groups*



Group Means for Symptom Severity Subscale
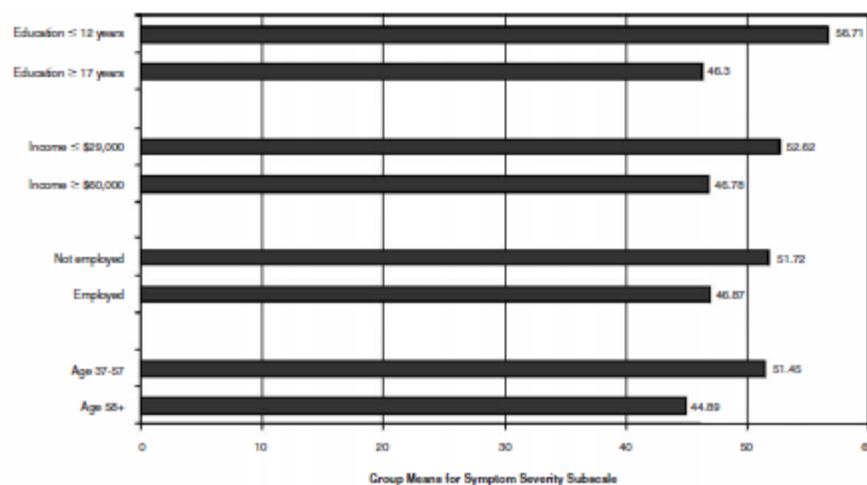
Notes: * P ≤ 0.05. For the entire sample, scores on the symptom severity subscale of the Fibromyalgia Impact Questionnaire ranged from 15 to 70.

*DISCUSSION*

This investigation demonstrates that FMS patients may differ in the level of severity of their symptoms based on certain demographic variables, such as age, employment status, level of household income, and level of educational attainment. Specifically, lower symptom severity scores were found in this sample among participants aged 58 and older versus those between the ages of 37 and 57, participants who were employed versus those who were not employed, participants with the highest annual household incomes [2: $60,000] versus those with the lowest annual household incomes [::: $29,000], and participants with the highest levels of educational attainment [2: 17 years] versus those with the lowest levels of educational attainment [::: 12 years]. The other demographic variables studied [gender, sexual orientation, relationship status, number of children, number of siblings, birth order, ethnic background, religious orientation, years of experiencing FMS symptoms, type of FMS on- set, age of onset, and whether the participant had ever received mental health treatment] were not significantly related to mean differences in symptom severity.

The sample used in this study was a nonrandom sample of FMS patients. There- fore, caution should be used in generalizing the findings beyond the sample. In particular, the finding that symptom severity did not differ significantly based on ethnic background should be interpreted with caution given the small number [N = 4] of participants who represented other ethnic backgrounds. However, the sample is consistent with other findings on the demographics of FMS patients in that most respondents were female [84 percent] and Caucasian [98 percent] (5, 13). Because this study was cross-sectional, causal attributions cannot be made between any demographic characteristics and symptom severity. In addition, only participants with access to a computer and basic computer skills would have been able to participate in this survey. Further research should be done to validate the findings of this study using representative and longitudinal sampling methods.

Another limitation of this study was its sole reliance on self-report data. Although participants verified that they had been diagnosed with FMS, we were unable to validate their diagnoses and other demographic information using other sources, such as medical records. In addition, we used a new subscale score from the FIQ to measure participants' symptom se- verity. Although this subscale demonstrated good internal consistency [$\alpha = 0.79$], additional research is needed to confirm the validity and usefulness of this subscale.

In sum, these findings suggest that certain demographic characteristics may indicate potential risk factors to identify FMS patients who are likely to experience more severe symptoms. These characteristics include age, employment status, income level, and level of educational attainment.  However, symptom severity scores did not differ based on several other demographic variables. These findings contribute to advancing the understanding of FMS patients, and they provide the support for assessing demographic characteristics as a component of the treatment of FMS patients. The  findings  also  provide  preliminary  evidence for a need to develop different treatment protocols  that  serve  the  needs  of  specific populations of FMS patients.

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