# Primary and Secondary Fibromyalgia Are The Same: The Universality of Polysymptomatic Distress

Frederick Wolfe, Brian Walitt, Johannes J. Rasker, and Winfried Häuser

*ABSTRACT.* ***Objective.*** Polysymptomatic distress (PSD) is the underlying metric of fibromyalgia (FM), and levels of PSD can identify criteria-positive FM with > 90% accuracy. We used levels of the PSD scale to test whether symptom levels in primary FM (PFM) and secondary FM (SFM) were the same and whether symptoms were equivalent in persons not meeting FM criteria.

***Methods.*** We studied 1525 patients with a clinical diagnosis of FM and 12,037 patients with rheumatoid arthritis (RA). We used regression models to compare patients with potential and actual PFM to RA patients with potential and actual SFM for 17 key clinical variables.

***Results.*** When controlled for PSD values, the widespread pain index, symptom severity scale, and pain, global, quality of life, and physical and mental component scores were essentially the same or only slightly different in PFM and SFM. Health Assessment Questionnaire-Disability Index scores were slightly higher in SFM (0.21 units), as was the painful joint count (1.6 joints). Overall, higher PSD scores were associated with more severe symptoms or abnormal status. PSD scores in patients not satisfying FM criteria and in patients satisfying criteria operated similarly.

***Conclusion.*** PFM and SFM are equivalent regarding symptom burden. PSD scores are more informative about severity and severity within diagnosis than dichotomization into FM/non-FM. Studies of FM versus "healthy individuals," or FM versus other diseases, are inherently defective, while studies of FM and PSD in RA offer the opportunity to have meaningful comparison groups, because there are no readily available unbiased appropriate controls for PFM. (First Release July 15 2018; J Rheumatol 2019;46:204–12; doi:10.3899/jrheum.180083)

*Key Indexing Terms*:
FIBROMYALGIA PRIMARY FIBROMYALGIA SECONDARY FIBROMYALGIA
RHEUMATOID ARTHRITIS POLYSYMPTOMATIC DISTRESS

For much of its defined existence, fibromyalgia (FM) and its predecessor diagnosis, fibrositis, was thought of as a dichotomous condition. One either had it or did not have it[1,2]. Tender points, however, were not very reliable, were difficult to use in general clinical practice, and failed as a severity and outcome measure in the clinic and clinical trials[3]. FM continued to be visualized and described as a binary condition until 2010, when the American College of Rheumatology (ACR) 2010 criteria were published[4].

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The 2010 criteria provided a dichotomous diagnosis as well as a tool to evaluate and measure symptom severity, the polysymptomatic distress (PSD) scale, also called the FM symptom scale. It was formed by combining the scores of the 2010 (and later 2011 and 2016) FM criteria components[5,6]. The scale is a 0–31 index that quantifies FM symptoms (or fibromyalgianess) and effectively describes the extent to which the FM diagnostic criteria are satisfied or exceeded. Patients with higher PSD scores have more symptoms and worse clinical status. There is no clear point on the scale where FM clearly transforms from absent to present. Instead, FM appears as a continuous disorder, but is constrained to be dichotomous by published criteria.

The advent of the PSD scale identified a number of problems in FM research. Regarding controlled studies, the location of control subjects on the PSD spectrum determines whether and to what extent they differ from those diagnosed with FM, a critical issue when FM is being studied with control subjects. In addition, it is uncertain whether a diagnosis of FM or the level of PSD have the same meaning regarding severity in primary FM (PFM) and secondary FM (SFM). PFM occurs as the dominant disorder and occurs in the absence of another clinically important and dominant pain disorder. SFM occurs in the presence of another clinically important and dominant medical disorder.

Studies requiring non-FM controls run into substantial problems. Given the range of symptom severity in those not satisfying FM criteria (PSD range about 0–11), "not FM" without further definition simply has no useful meaning. "Healthy controls," although widely used[7,8], are inappropriate for most comparative studies because the issues usually involve patients with pain, not persons without pain. One solution to the extreme bias introduced by using "healthy" subjects is instead to use all persons without FM as controls, as in an epidemiology study. However, the expense and difficulty of obtaining an epidemiology population make that solution generally impossible. In addition, most persons in population studies are "healthy" (Table 1, population PSD ≤ 3)[9]. Because there are no readily available unbiased appropriate controls for FM, another potential solution would be to gather symptomatic patients and use them as control subjects. Such a solution, however, is problematic because such patient groups would vary in severity and selection characteristics and hence would likely be biased.

We have suggested the use of a defined but unbiased clinical population, for example, patients with rheumatoid arthritis (RA). And we have previously studied FM using patients with RA who are being followed in a research databank, the National Data Bank for Rheumatic Diseases (NDB)[10]. These subjects are unbiased in that they were selected only because they have RA and not for any FM-related characteristics[6].

For such an approach to be appropriate, patients with what has been called PFM must be clinically the same in FM characteristics and outcomes, as those with SFM. In our current study, we compare patients with RA comprising those with and without FM, with "primary" pain patients. For primary pain patients, we use patients previously referred to the NDB with a diagnosis of FM, including about half who do not now satisfy FM criteria.

*Table 1*. Characteristics of study participants. Values are % or mean ± SD unless otherwise specified.

| Variables | FM | RA | Population* |
|---|---|---|---|
| No. subjects | 1525 | 12,037 | 2445 |
| Age, yrs | 56.9 ± 12.8 | 60.5 ± 13.5 | 50.2 ± 17.4 |
| Female sex | 95.3 | 82.0 | 53.5 |
| Clinical referral FM diagnosis | 100 | NA | NA |
| 2016 criteria FM diagnosis | 52.9 | 22.3 | 2.0 |
| PSD score | | | |
| All subjects | 16.5 ± 7.4 | 10.0 ± 7.5 | 3.0 ± 3.6 |
| FM+ subjects | 21.9 | 20.7 | NA |
| ≤ 3 | 2.8 | 20.8 | 68.5 |
| ≥ 4 and ≤ 11 | 24.3 | 45.3 | 28.1 |
| Correctly classified as FM by PSD at optimum PSD score | 88.9 | 92.7 | 98.9 |

* 2013 population study in German general population[9]. FM: fibromyalgia; RA: rheumatoid arthritis; PSD: polysymptomatic distress; NA: not available.

In this report, we studied whether these RA and pain patients are similar in key self-reported outcomes when they are studied at the same levels of PSD. We bridged and linked the FM/non-FM gap by using the PSD scale. We hypothesized that self-reported outcomes would be the same except when specific disease-related features are studied. For example, patients with RA would have increased use of prednisone and patients with FM of pregabalin. If results showed the anticipated similarity, we hypothesized that in future studies, control subjects can appropriately be chosen from clinical populations and not from healthy controls. In addition, if we found similarities, we could come to some conclusions about the characteristics of FM and how it may be studied. Finally, we provided evidence of whether PFM and SFM can be considered the same condition.

## MATERIALS AND METHODS

*NDB datasets*. We used the longitudinal research database of the NDB to study PFM and SFM. Beginning in 2010, the NDB collected FM criteria items from all participants completing its semiannual research questionnaire. This onset date was consistent with the then-new ACR 2010 preliminary criteria for the diagnosis of FM[4]. The details of the NDB and its activities have been reported previously[11,12]. In our study, we reported on 2 datasets of adult participants. The first contained 1525 participants referred to NDB with a diagnosis of FM, and without evidence of a concomitant inflammatory disorder. The second set contained 12,037 patients with RA. Where patients had > 2 observations in the dataset, we selected a single random observation for study.

Patients with RA were referred to the NDB only because they had RA. They had not been evaluated in any way for the presence of FM and were not selected in any way for FM characteristics. Patients with FM were referred by physicians who indicated or confirmed a diagnosis of FM. Results of physician FM criteria testing, if used, were not available. *Ad hoc* NDB FM criteria available before 2010 suggested that many of these patients did not satisfy criteria when tested[13]. We hypothesized that when these patients were referred to the NBD, they may have met some criteria at the time of referral or in the past, or they may have been diagnosed using clinical judgment. To be counted as an FM case in our study, however, patients had to satisfy criteria for FM based on the 2016 revision of the ACR 2010 criteria[6]. FM patients not meeting the 2016 criteria were included in the study as noncriteria-positive FM subjects. In the abstract we have referred to them as "potential" cases. We considered that these potential and actual cases constituted the PFM group. Figure 1 indicates that many of these noncases had elevated (> 3) PSD scores. Similarly, patients with RA constituted the potential or actual SFM group.

*NDB FM and clinical variables[4,6]*. The widespread pain index (WPI; 0–19) is a summary count of the number of 19 painful regions from the Regional Pain Scale, a self-reported list of painful regions[14].

The symptom severity scale (SSS; 0–12) is the sum of the severity scores of 3 symptoms (fatigue, waking unrefreshed, and cognitive symptoms; 0–9) plus the sum (0–3) of the number of the following symptoms the patient has been bothered by that occurred during the previous 6 months: headaches (0–1), pain or cramps in lower abdomen (0–1), and depression (0–1).

The PSD scale (0–31), also known as the FM symptom score, is the sum of the WPI and SSS. The PSD scale measures the magnitude and severity of FM symptoms in those satisfying and not satisfying criteria.

*2016 criteria*. A patient satisfies modified 2016 FM criteria if the following 3 conditions are met: (1) WPI ≥ 7 and SSS score ≥ 5, or WPI 4–6 and SSS score ≥ 9; (2) generalized pain, defined as pain in at least 4 of 5 regions, must be present (jaw, chest, and abdominal pain are not included in generalized pain definition; (3) symptoms have been generally present for at least 3 months; and (4) a diagnosis of FM is valid irrespective of other diagnoses.

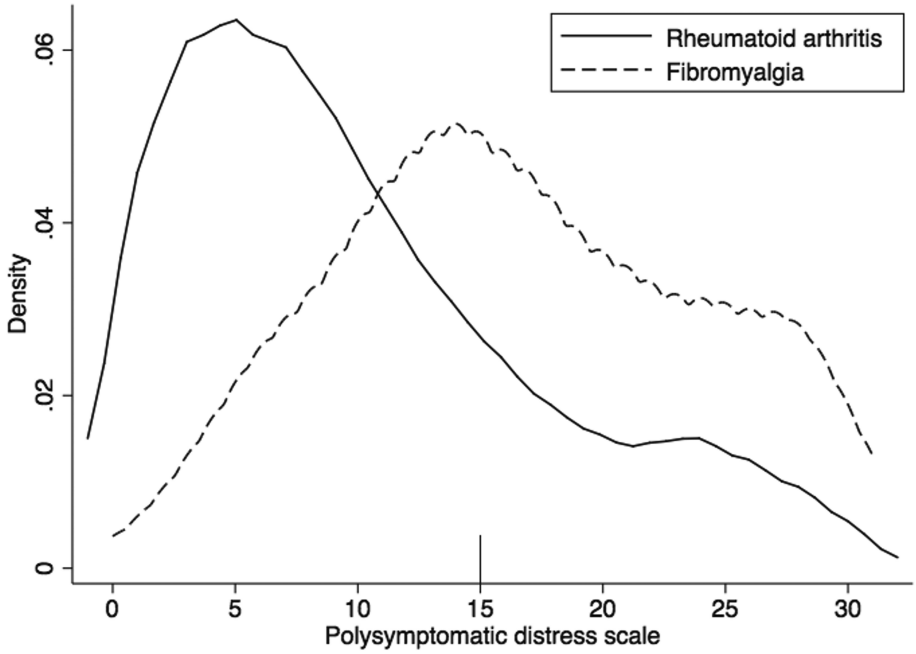


*Figure 1*. Distribution of PSD score in patients referred to National Data Bank for Rheumatic Diseases with RA and FM diagnoses. Vertical line at PSD = 15 most accurately separates 2016 FM criteria–positive subjects from 2016 FM criteria–negative subjects. PSD: polysymptomatic distress; RA: rheumatoid arthritis; FM: fibromyalgia.

A diagnosis of FM does not exclude the presence of other clinically important illnesses[6].

*Other study variables*. To determine outcome and clinical status, we evaluated a series of clinical variables. Pain and global severity were assessed using 0–10 visual analog scales. Questions were "How much pain have you had because of your illness the past week" and "Considering all the ways your illness affects you, rate how you are doing on the following scale." To rate quality of life, we used a "health thermometer." A score of 100 indicates perfect health and a score of 0 indicates death[15]. The symptom count was a count of 36 symptoms that may have been experienced by patients in the last 6 months. The joint count was adapted to a binary format from the Rheumatoid Arthritis Disease Activity Index questionnaire[16]. Functional status was measured using the Health Assessment Questionnaire-Disability index (HAQ-DI)[17]. We also calculated the physical (PCS) and mental component summary (MCS) scores from the Medical Outcomes Study Short Form-36 (SF-36)[18]. In addition, patients reported the use, dose, and frequency of all prescribed and over-the-counter medications, including specific opioids, as previously described[19].

*Statistical analysis*. Data were analyzed using Stata version 15.0[20]. To aid in visualization for graphics, we converted the continuous 0–31 PSD scale into 6 PSD categories (0–5, 6–10, 11–15, 16–20, 21–25, 26–31). We categorized age into 3 groups (< 40, 40–65, ≥ 65 yrs) and used the interaction between age group and sex as covariates in all regression analyses. To analyze the effect of PSD adjustment, we performed either linear or logistic regression, as appropriate, and regressed the dependent variable on all levels of the interaction of clinical diagnosis and PSD category, while controlling for age category and sex interaction. We used Stata's margins procedure to estimate margins of responses for all values of PSD and diagnosis categories, and the margins plot procedure to display results[20]. Margins in this instance were statistics calculated from predictions of a previously fit linear or logistic regression model at fixed values of all possible combinations of clinical diagnosis (PFM and SFM) and the 6 PSD categories. Contrasts following margins provide difference values for comparison categories and statistical significance. We set the significance level at $p \leq 0.05$. We used effect sizes and OR as measures of the degree of difference between PFM and SFM in PSD-unadjusted analyses.

We used Stata's roctab procedure to perform nonparametric receiver-operating curve (ROC) analysis and estimate the area under the curve (AUC) for the analysis of prediction of FM 2016 criteria status by PSD. We labeled as the "best" prediction cutpoint the level of PSD that had the highest level of correct criteria-based diagnosis.

*Ethics and institutional review board (IRB) approval*. This study was conducted in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 1983. All participants gave informed consent. The study was approved by the Via Christi IRB (Wichita, Kansas, USA, FWA00001005).

## RESULTS

Table 1 provides information about the 2 clinical groups, and to provide additional comparative information, general population data for FM and FM-related variables (column 4)[9]. The 2 clinical groups, FM and RA, differed in demographic variables (Table 1). The patients with FM were slightly younger (56.9 vs 60.5 yrs) and almost all were women (95.3% vs 82.0%). Variables relating to RA status for patients with RA were as follows: RA duration (16.2 years), prednisone (16.2%), any disease-modifying antirheumatic drug (64.6%), methotrexate (MTX; 46.1%), and biologics (43.5%). FM 2016 criteria were satisfied by 52.9% of patients referred with FM and 22.3% of those referred with RA. The

distribution of PSD scores for the 2 groups can be seen in Figure 1. A line at 15 indicates the level of PSD that best separates patients meeting FM 2016 criteria from those not meeting the criteria. We obtained evidence for the ≥ 15 line by conducting nonparametric ROC analysis for prediction of FM 2016 criteria for the combined groups from PSD. In those analyses, the AUC was 0.97 and the best level of PSD prediction of FM diagnosis was ≥ 15 (91.7% correct). Correct classification for the individual groups is shown in Table 1 and ranged from 88.9% in study patients with FM to 98.9% in the general population. All 3 groups differed significantly in PSD scores and in the percent of subjects in the PSD score ≤ 3 (healthy) and PSD score 4–11 groups (symptomatic). The mean PSD score was 16.5 in PFM compared with 10.0 in SFM. These data indicate that non-FM patients (or potential controls) differed in symptom severity according to their clinical diagnoses.

The mean unadjusted values for key variables for RA and FM patients are shown in columns 2 and 3 of Table 2, and the unadjusted differences and ES/OR in columns 4 and 5. As expected, values were more abnormal or adverse for patients with FM compared to those with RA. To understand whether these variable values were similar at levels of PSD, we performed regression analyses adjusted for PSD values. To enhance visualization and interpretation, we divided PSD into 6 groups. Figure 2, Figure 3, and Figure 4 show the results of these analyses. Table 2 shows the difference in values after adjustment. Negative difference values indicate a more abnormal score for patients with FM, except for SF-36 PCS and MCS scores that are reversed, and for quality of life (QoL) values. For continuous variables, we reported the adjusted difference. For binary variables, we reported the percent difference.

Figure 2 demonstrates that when controlled for PSD, pain, patient global and health-related QoL scores are essentially the same. Adjusted mean differences are very small, from 0.2 to 7.0% of 1 SD (Table 2). For HAQ functional disability there is also a small but real difference (0.21 units), about 29% of 1 SD, likely reflecting anatomical changes present in patients with RA. In Figure 3, we examined the 2 components of the PSD, WPI, and SSS to determine whether increased symptoms or pain sites were associated with clinically diagnosed FM or RA. There were very small differences in WPI (–0.04) and SSS (–0.27). An increase in joint counts of 1.63 units was noted for the RA groups, and a slight increase in the count of symptoms (–0.98 symptoms) was noted for the FM group.

In Figure 4 and Table 2, we examined variables that were expected to be different between the groups. We noted that opioid and pregabalin use was substantially increased in the FM group and prednisone was increased in the RA group. Among other variables, body mass index (BMI; –0.92 units) and MCS (1.18 units) were slightly more abnormal in the FM group. There was no difference in PCS and total household income.

Overall, for almost every variable shown in the figures (except prednisone), higher PSD scores were associated with more severe symptoms or abnormal status.

To provide detailed information about patients who satisfied FM criteria, we performed the same analyses on

*Table 2A*. Raw and PSD-adjusted scores for all patients diagnosed with RA or fibromyalgia.

| Variables | Unadjusted PSD | | Differences[◊] | | |
|---|---|---|---|---|---|
| | RA, n = 12,037, Mean (SD) or % | FM, n = 1602, Mean (SD) or % | Unadjusted Difference | Unadjusted ES/OR | Adjusted Difference |
| Figure 2 | | | | | |
| Pain, 0–10 | 3.8 (2.8) | 5.6 (2.6) | –1.57 | –0.62 | –0.03[†] |
| Global, 0–10 | 3.7 (2.6) | 5.1 (2.4) | –1.27 | –0.54 | –0.18[†] |
| HAQ, 0–3 | 1.0 (7.7) | 1.1 (0.6) | –0.06 | 0.13 | 0.21 |
| QoL, 100–0* | 64.8 (21.0) | 58.2 (20.3) | –6.25 | –0.31 | –0.43 |
| Figure 3 | | | | | |
| WPI, 0–19 | 5.7 (5.5) | 9.9 (5.7) | –3.86 | –0.75 | –0.04 |
| SSS, 0–12 | 4.2 (2.9) | 6.6 (2.9) | –2.06 | 0.82 | –0.27 |
| Symptoms, 0–36 | 8.3 (6.4) | 13.4 (6.7) | –4.63 | 0.80 | –0.98 |
| Joint count, 0–18 | 8.2 (5.6) | 9.9 (5.5) | –1.35 | 0.30 | 1.63 |
| Figure 4 | | | | | |
| Opioids | 28.1 | 44.3 | 14.48 | 0.51[Δ] | –1.57[†] |
| Pregabalin | 3.5 | 16.8 | –11.96 | –0.19[Δ] | –4.58 |
| Prednisone | 28.8 | 4.5 | –23.18 | 6.83[Δ] | 24.30 |
| Smoking | 11.2 | 15.0 | –3.01 | –0.76[Δ] | 1.40 |
| Other variables | | | | | |
| BMI | 28.9 (7.2) | 31.0 (7.7) | –1.79 | 0.28 | –0.92 |
| Income, US$ | 53,693 (31,261) | 48,940 (30,689) | 5497 | –0.15 | 173[†] |
| PCS, 100–0* | 37.2 (11.3) | 32.8 (9.4) | 3.89 | –0.38 | –0.52 |
| MCS, 100–0* | 48.2 (11.9) | 41.9 (12.6) | 5.41 | –0.52 | 1.18 |
| College | 37.9 | 36.8 | 2.20[†] | 1.10[Δ] | 0.76[†] |

*Table 2B*. Raw and PSD-adjusted scores for FM+ patients diagnosed with RA or FM.

| Variables | Unadjusted PSD | | Differences◊ | | |
|---|---|---|---|---|---|
| | RA, n = 2642, Mean (SD) or % | FM, n = 806, Mean (SD) or % | Unadjusted Difference | Unadjusted ES | Adjusted Difference |
| Figure 2 | | | | | |
| Pain, 0–10 | 6.4 (2.2) | 6.6 (2.1) | –0.17† | 0.09 | –0.06† |
| Global, 0–10 | 6.0 (2.1) | 6.1 (2.0) | –0.09† | 0.04 | 0.02† |
| HAQ, 0–3 | 1.6 (0.6) | 1.3 (0.6) | 0.26 | –0.45 | 0.27 |
| QoL, 100–0* | 52.3 (18.5) | 51.9 (19.1) | 0.75† | –0.02 | 0.22† |
| Figure 3 | | | | | |
| WPI, 0–19 | 13.2 (4.4) | 13.7 (5.7) | –0.44 | 0.11 | 0.34 |
| SSS, 0–12 | 7.6 (1.9) | 8.2 (2.0) | –0.53 | 0.32 | 0.34 |
| Symptoms, 0–36 | 15.1 (6.4) | 16.6 (6.1) | –1.29 | 0.24 | –0.86 |
| Joint count, 0–18 | 14.4 (3.8) | 12.8 (4.6) | 1.62 | 0.38 | 1.80 |
| Figure 4 | | | | | |
| Opioids | 49.9 | 53.6 | –3.38† | 0.87Δ | –2.69† |
| Pregabalin | 7.3 | 21.7 | –14.15 | 0.29Δ | –12.26 |
| Prednisone | 34.2 | 6.1 | 27.69 | 7.72Δ | –26.20 |
| Smoking | 16.1 | 20.5 | –4.09 | 0.75Δ | –4.46 |
| Other variables | | | | | |
| BMI | 31.1 (8.2) | 32.1 (8.0) | –0.71 | 0.11 | –0.50† |
| Income, US$ | 44,952 (30,547) | 44,379 (30,129) | 1103† | –0.02 | –398† |
| PCS, 100–0* | 28.7 (7.6) | 29.6 (97.6) | –0.90 | 0.13 | –0.98 |
| MCS, 100–0* | 39.4 (11.4) | 38.1 (11.6) | 1.14 | 0.11 | 0.76† |
| College* | 29.8 | 30.9 | 0.03† | 1.00Δ | –0.82† |

* Lower values are more abnormal. † $p > 0.05$. ◊ Adjusted and unadjusted differences refer to adjustment by PSD values, and all variables are adjusted for age and sex. Δ Unadjusted OR. FM: fibromyalgia; RA: rheumatoid arthritis; PSD: polysymptomatic distress; ES: effect size; HAQ: Health Assessment Questionnaire; QoL: Quality of Life; WPI: widespread pain index; SSS: symptom severity scale; BMI: body mass index; PCS: physical component summary of Medical Outcomes Study Short Form-36 (SF-36); MCS: SF-36 mental component summary.

criteria-positive patients in the lower half of Table 2. In general, except for disease-specific variables (e.g., prednisone and pregabalin), differences were small between PFM and SFM, indicating that criteria identified very similar subjects. Adjustment for PSD reduced differences even further.

## DISCUSSION

In this report, we examined whether a criteria-based diagnosis of FM or the use of the PSD scale resulted in similar outcomes when applied to patients with a clinical diagnosis of PFM and to patients with RA. As noted above, we used the term "primary" to denote patients without another pain or musculoskeletal disease and "secondary" to indicate patients who satisfied FM criteria and had another dominant and important pain or musculoskeletal disease (in this instance, RA). This terminology follows the definition of the 1990 ACR criteria for FM[2], and although deprecated in the 1990 criteria, continues to be used today[21,22]. In addition, by including only persons who had once been diagnosed with FM in the FM group, we were assured that the implied controls for FM (those in the FM group who did not now satisfy FM 2016 criteria) did not have an inflammatory disorder. In effect, we had 2 groups and 2 subgroups: RA patients who did and did not meet FM criteria and persons with PFM symptoms who did and did not meet criteria. This latter subgroup has never been studied before, to our knowledge, but constituted 47.1% of non-RA patients. As shown in Figure 1, a full range of PSD scores existed in the RA and non-RA groups.

Essentially, the question we asked in our study was whether patients in the RA and non-RA groups had the same level of outcomes, symptoms, and characteristics at points across the PSD scale as well as when satisfying criteria for FM. If the key outcomes were the same or closely similar, we would conclude that FM diagnosis and PSD scores were similar and had the same meaning across the primary and secondary conditions. The results of our study (Figure 2, Figure 3, Figure 4, and Table 2) showed that there was excellent agreement for pain, patient global, health-related QoL, symptom severity, WPI, PCS, and MCS. These equivalency findings were consistent across the near PSD = 15 dividing line. Some differences were noted. The use of prednisone, pregabalin, and opioids differed between the groups, as expected. The largest outcome variable difference was for the HAQ-DI (0.21 units or 29.2% of 1 SD), a difference that is considered clinically important[23]. The difference in HAQ scores is explained by structural joint and musculoskeletal damage that occurs in RA but not in FM. A similar increase in joint count in RA (1.63 joints or 29.3% of 1 SD) was also anticipated and noted. These specific differences are important, because they indicate that the PSD scale does not affect such measures. Overall, the data of our study

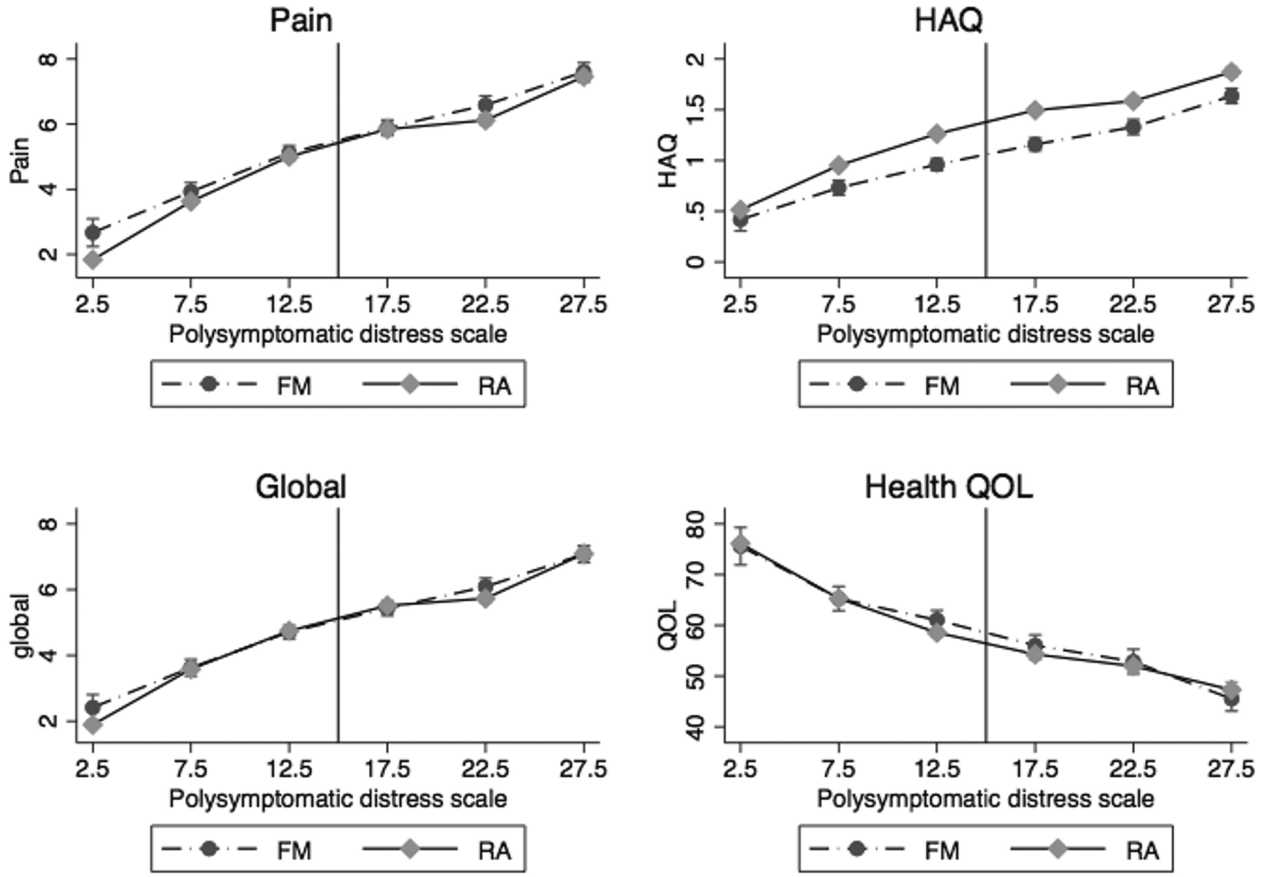


*Figure 2*. Plots of pain, HAQ, patient global, and health-related quality of life at levels of the PSD scale. Vertical line at PSD = 15 most accurately separates 2016 FM criteria–positive subjects from 2016 FM criteria–negative subjects. HAQ: Health Assessment Questionnaire; PSD: polysymptomatic distress; FM: fibromyalgia; QOL: quality of life; RA: rheumatoid arthritis.

showed that primary and secondary (or noninflammatory and inflammatory) disorders were equivalent regarding FM and PSD levels. Although it was not a main point of our study to investigate whether psychosocial characteristics were also similar, given that patient recruitment methods differed, we did examine smoking, BMI, MCS, and the percentage with college education. As with symptom variables, little difference was found after PSD adjustment.

Our observations are important for a number of reasons. First, the demonstration of the presence and equality of FM and FM symptoms across medical conditions provides a reason to doubt much FM research in which FM is treated as disease to be compared with other diseases[24,25]. Such studies are common, but are innately defective and invalid, and lead to erroneous conclusions because FM can also be present in what would be considered the control group.

In addition, the results of our study demonstrate that "abnormalities" (such as pain, fatigue, etc.) extend through the PSD scale range and not just in those who satisfy FM criteria. Our findings, that there is a universality of symptoms across differently categorized patients and an equality of response at all levels of PSD, suggest that such a response should not be unexpected. Instead it may reflect an evolutionary stress response[26,27,28].

Second, despite assertions of equivalency[6], investigators and clinicians have been loath to say that FM in persons with noninflammatory pain is really the same as in FM in patients with inflammatory disorders such as RA, or even in patients with cancer or other serious medical conditions. As a consequence, most studies of FM have been conducted in patients with PFM[29,30]. The idea and attractiveness of PFM runs into a serious problem regarding the characteristics of control subjects. Should they include the following: (1) anyone without FM; (2) anyone with non-FM musculoskeletal pain; or (3) "healthy individuals?" If controls are just healthy individuals, a distorted and misleading picture emerges because, in effect, we are examining subjects at the 2 ends of the PSD distribution curve: many symptoms versus no symptoms. As shown in Table 1, a previous epidemiological study showed that 68% of the general population had PSD score ≤ 3 (healthy persons) compared with 21% of RA patients in our study[9]. Except for studies that have a good reason to select "pain-free" controls, we believe that in most instances, meaningful controls (when pain is being studied)

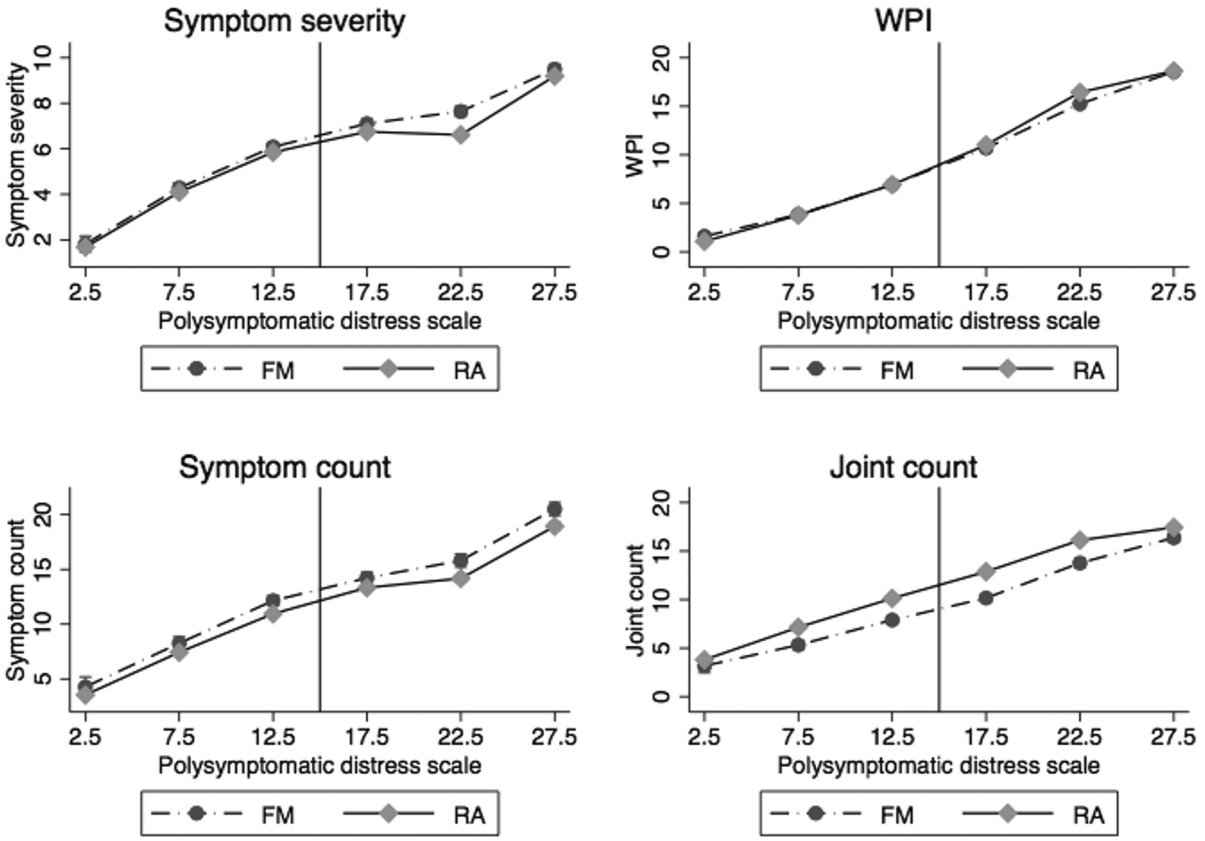


*Figure 3*. Plots of SSS, WPI, symptom count, and joint count at levels of the PSD scale. Vertical line at PSD = 15 most accurately separates 2016 FM criteria–positive subjects from 2016 FM criteria–negative subjects. SSS: symptom severity scale; WPI: widespread pain index; PSD: polysymptomatic distress; FM: fibromyalgia; RA: rheumatoid arthritis.

should be mostly symptomatic persons without FM, an example of which are studies by Brummett, *et al*[31,32].

However, the problem of finding such controls for PFM is real, because there is no easily available appropriate source that is not complicated by selection bias (e.g., patients attending a back pain clinic). Our current study, by showing the equivalency of PSD and criteria in RA and PFM, suggests that FM could be studied in diseases where there is no selection bias in patient participation, such as RA. Because all patients with RA require treatment, selection bias in severity or FM characteristics does not occur. The use of controls who are symptomatic opens up an avenue for more comprehensive study and understanding of FM and non-FM pain.

Another important finding of our study is the demonstration that the higher the PSD score, the worse the outcome or psychosocial characteristic. While this has been shown previously[33], it has not been simultaneously and equivalently demonstrated in primary and secondary disorders. As shown in Figure 2, Figure 3, and Figure 4, regardless of disease status, every symptom or social disadvantage increases or becomes more abnormal with increasing PSD score. We believe that it would be more appropriate to think of patients across the spectrum of symptom severity rather than classifying them into 2 categories (FM yes or no). PSD measurement is a better way to handle people with fluctuating levels of severity than to move them to and fro in categories. But this requires abandoning the idea of FM as a separate disorder.

Although we have concluded that PFM and SFM are the same condition, one limitation of our study was the absence of other forms of SFM. The NDB, however, contains data on other diseases, including osteoarthritis (OA). Because OA in the NDB is associated with selection bias, we elected not to study it in this report. We did, however, run the same analyses on patients with OA, and with the same conclusion: PSD-adjusted outcomes were essentially the same in FM and in OA. Another potential limitation to these data was our inability to know about other diagnoses. For example, we could not tell whether patients with PFM had unrecognized RA. However, no patient with FM in the study used MTX or biologics, which are the best identifiers of RA in survey studies.

PFM and SFM are essentially equivalent regarding symptom burden and other variables. PSD scores are much more informative about severity and diagnosis than a dichotomization into FM or non-FM.

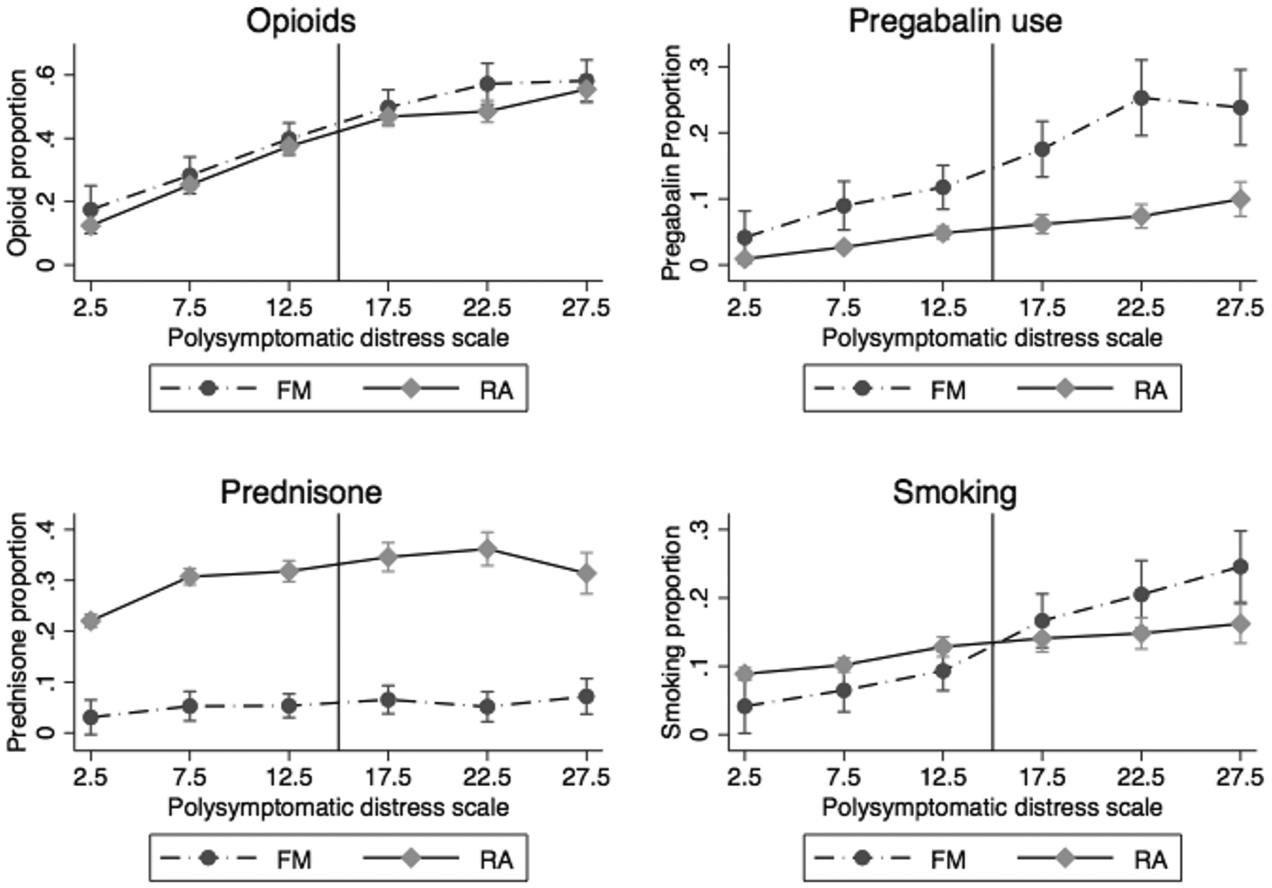


*Figure 4*. Plots of opioid use, pregabalin use, prednisone use, and proportion of subjects currently smoking at levels of the PSD scale. Vertical line at PSD = 15 most accurately separates 2016 FM criteria–positive subjects from 2016 FM criteria– negative subjects. PSD: polysymptomatic distress; FM: fibromyalgia; RA: rheumatoid arthritis.

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