Research Article

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Pain acceptance and its impact on function and symptoms in fibromyalgia

Abstract

Objectives: Fibromyalgia is a chronic widespread pain
(CWP) syndrome of unknown etiology with substantial
burden of illness and functional impairment. Pain accep-
tance has emerged as an interesting target of therapy in
chronic pain populations, but few studies have yet been
done on the effect of pain acceptance on patients with fi-
bromyalgia. The aim of the present study was to examine
the relationship between pain acceptance and its impact
on function and symptoms in fibromyalgia with both a
cross-sectional and longitudinal design.
Methods: Three hundred and sixty five participants aged
22–70 with fibromyalgia were recruited from the Norwe-
gian Fibromyalgia Association (NFA). They filled out a
questionnaire containing the Fibromyalgia Impact Ques-
tionnaire (FIQ), measurement of function and symptoms,
and Chronic Pain Acceptance Questionnaire (CPAQ),
measurement of pain acceptance, in addition to socio-
demographic and clinical variables such as degree of fi-
bromyalgia, depression and pain duration (T1 measures).
One year after, 87 of the participants filled out the FIQ and
clinical measures once again (T2 measures). Unadjusted
and adjusted linear regression analyses were performed
both for cross-sectional measures at T1 and for longitudinal
measures from T1 to T2, with FIQ score as the outcome
variable and CPAQ score at T1 as one of the main inde-
pendent variables.
Results: Higher CPAQ score was significantly associated
with a lower FIQ score at T1, also when adjusting for age,
education, work, depression and Fibromyalgianess Score
(p<0.01). Lower FIQ score indicate less impact of fibromy-
algia on functioning. In addition, two adjusted linear
regression models found higher pain acceptance (CPAQ
score) at T1 to be associated with lower negative impact of
fibromyalgia on function and symptoms (FIQ score) at T2
(p<0.01).
Conclusions: Higher pain acceptance is associated with
better functional level and less symptoms in fibromyalgia,
both cross-sectionally and when measurements are sepa-
rated in time. Further research should include experi-
mental studies with acceptance-based interventions for
this patient group.

Keywords: fibromyalgia; function; longitudinal; Norwegian
Fibromyalgia Association; pain acceptance.

Introduction

Fibromyalgia is a chronic wide-spread pain syndrome, also
characterized by fatigue, sleep disturbances, cognitive
dysfunction, depressive symptoms, headache and irritable
bowel [1–4]. Other comorbid medical symptoms such as
dysmenorrhea, temporomandibular joint disorder and
anxiety are common [5] along with more than 40 medical
unexplained symptoms [6]. Diagnostic criteria were estab-
lished by the American College of Rheumatology in 1990 [7]
with revisions in 2010/2011 [1, 6] and 2016 [8].

The global prevalence of the condition lies between 0.2
and 6.6% [9] with a female majority. Traditionally, treatment
paradigms of chronic pain have assumed that the primary
aims should be reduced pain and increased control over re-
sponses to pain [10]. However, this may not always be possible
to achieve, nor result in better functioning and quality of life. In
general, the effect sizes for most established treatments are
modest, but recently the European League Against Rheuma-
tism have recommended a multidisciplinary step-by-step

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approach in fibromyalgia treatment, focusing on patient education, lifestyle advice and non-pharmacological interventions before medication [11]. They say that all fibromyalgia patients should have individualized physical exercise, while pain psychology approaches such as cognitive behavioral therapy or mindfulness-based stress reduction are recommended for some; however, the evidence is still insufficient [11]. Sometimes the goal of pain reduction can be contra-productive if the coping methods manifest themselves as pain avoidance [12]. Avoidance is associated with higher pain intensity, more pain-related anxiety and depression, more functional, mental and work disability and is regarded a perpetuating mechanism for chronic pain according to the *fear avoidance model* of pain [13].

Pain acceptance is defined as the willingness to experience continuing pain without efforts to reduce, avoid, or otherwise change it [14]. The relation between pain acceptance and impact of illness has been examined in multiple studies with mixed samples of chronic pain patients [10, 12, 15–22], and the general tendency shown is that higher levels of pain acceptance are associated with better day-to-day functioning and less disability and symptoms. Research has revealed acceptance as giving much more predictive positive outcomes than the amount of pain itself faced by chronic pain patients [12, 21, 23]. However, fibromyalgia-specific studies on acceptance are few. Rodero et al. [24] found that a greater pain acceptance in fibromyalgia was associated with less pain and better functioning in a cross-sectional study with 167 participants. Yu et al. discovered a correlation between pain acceptance and several measures of functioning in their study of self-as-context in fibromyalgia [25]. Trainor et al. [26] found higher general psychological acceptance to be associated with better functioning in 339 individuals with fibromyalgia. In another study with 92 patients with fibromyalgia, Lami et al. [27] found a lower prevalence of anxiety, depression and functional impairment in those with higher pain acceptance. It remains of interest to further examine the relations between pain acceptance and impact of illness in fibromyalgia, given the scarce amount of fibromyalgia-specific research on this topic. To the best of our knowledge, no study has explored these relations in a longitudinal manner before.

The study aim was to see whether the cross-sectional association between acceptance and impact on function and symptoms found in previous fibromyalgia-specific research were present also in a Norwegian sample, and to explore if the same association was present when assessed longitudinally. The hypothesis is that a higher level of pain acceptance in patients with fibromyalgia is associated with lower impact on function and symptoms, and that this association can be seen both cross-sectionally and longitudinally.

Materials and methods

Design and participants

The study has a longitudinal design reporting on a cross-sectional sample at T1 with a follow-up of a subsample (T2) after one year (see Figure 1). In total, 399 patients diagnosed with fibromyalgia were recruited from 1,033 eligible members of the Norwegian Fibromyalgia Association (NFA) from all regions in Norway. Inclusion criteria were patients aged 18–70 with a former fibromyalgia diagnosis marked with a "yes" on the question "Do you have or had previously fibromyalgia?" (Derived from the Nord-Trøndelag Health Study, HUNT 3) [28]. Of the 399, five were excluded because of lacking information or "no" at the question of a fibromyalgia diagnosis (n=394). Another 29 were excluded because of age over 70 years old, leaving a total of 365 respondents in the T1 group (see Figure 1). One year after, 144 of the NFA members from the Trondheim region or from Bergen were asked to participate in a second assessment. Of these, 91 agreed to the follow-up. Four participants were excluded because of age over 70, leaving a total of 87 respondents from baseline to be included at T2.

Measures

Pain acceptance: The Chronic Pain Acceptance Questionnaire-20 (CPAQ-20) [21, 29] was used to measure pain acceptance once (T1). CPAQ is widely used in pain research and considered to be a valid measure of pain acceptance. It is a 20-item descriptive scale and self-report questionnaire designed to assess the two core aspects of pain acceptance: Activity engagement (to which degree the respondent manages to participate in daily activities despite pain) and pain willingness (the ability to experience pain without trying to control, change or avoid it). A seven-point Likert scale is used, from 0 (never true) to 6 (always true). Nine of the items are scored inversely, and together they make up the Pain Willingness Score (PWS). Eleven items are scored directly to make up the Activity Engagement Score (AES). The total score (CPAQ) is the sum of PWS and AES, and ranges from 0 to 120. Higher score reflects higher acceptance of pain and higher participation in activities. The internal consistency of the Norwegian version of CPAQ-20 [29] is previously found adequate (Cronbach's alpha of 0.85) and in line with international studies (Cronbach's alpha of 0.82) [21]. In this study, Cronbach's alpha for CPAQ was 0.88.

Fibromyalgia Impact: The Fibromyalgia Impact Questionnaire (FIQ) was used at two time-points to examine the impact of fibromyalgia on function and level of symptoms through the last week [30]. It is one of the most widely used specific questionnaires in fibromyalgia studies, comprising 10 items (20 questions) which are computed into an FIQ function score, FIQ overall impact score and an FIQ symptom score. FIQ total is the sum score of all 10 items, with 100 as its maximum. Higher scores indicate greater impact of fibromyalgia on functioning. The FIQ evaluates the total spectrum of fibromyalgia-related problems [31]. It has been shown to have credible construct validity, reliable test-retest characteristics and a good sensitivity to appropriate clinical change [32, 33]. A Norwegian direct translation of the English 2002 version was used in this study. The newer, revised FIQ version, FIQ-R, is not translated into Norwegian. Internal consistency for FIQ total at baseline, measured by Cronbach's alpha, was 0.58.
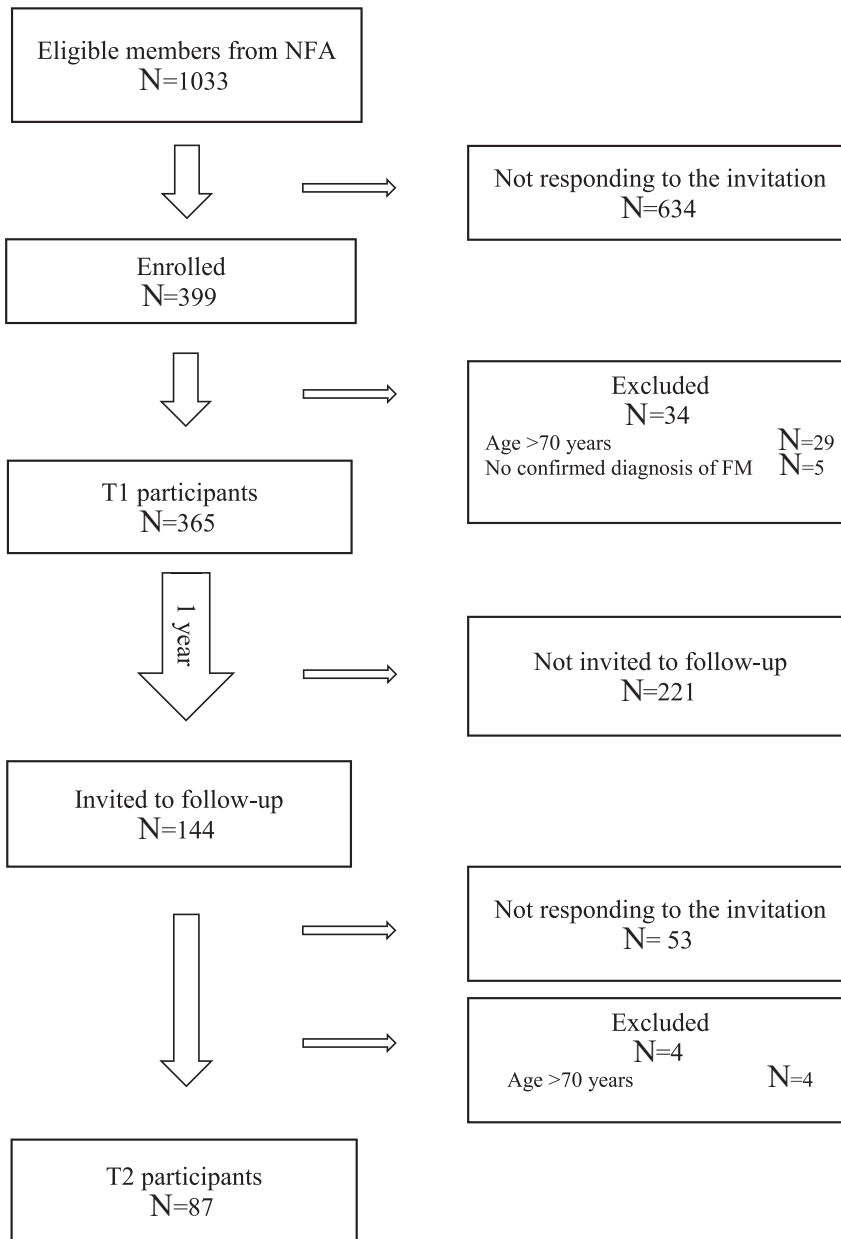
Figure 1: Design and participants.

Depression: Depression was examined twice using a single-item screening question. The respondents stated how much sadness or depressive symptoms they had been experiencing the last 30 days. The answers were given on a 4-point Likert scale ranging from 0 = "not at all"; 1 = "a little"; 2 = "some"; 3 = "serious". For analysis purposes the scale was dichotomized into 0 = "no or a little", 1 = "some or serious".

In a Norwegian study, the single-item depression screening has shown a sensitivity of 95% and specificity of 56% compared to an MINI interview as the gold standard [34].

Fibromyalgianess Scale: The Fibromyalgianess Scale, also known as the Fibromyalgia Symptom Scale or Polysymptomatic Distress Scale, was used to measure the degree of illness at two time-points. It is made up of the Widespread Pain Index (WPI) and Symptom Severity Scale (SSS), both of which are core measurements in the revised

diagnostic criteria for fibromyalgia [4] The maximum score of SSS is 12 and the maximum score of WPI is 19, making the maximum score of the Fibromyalgianess Scale 31. Internal consistency for the Fibromyalgianess Scale at baseline, measured by Cronbach's alpha, was 0.765.

Pain duration: Pain duration was assessed once (T1). Responses were given on an ordinal scale with eight response options ranging from "0–3 months" up to "more than 10 years". Based on sample characteristics, the scale was dichotomized for analysis purposes to "≤10 years" or ">10 years". A similar approach has been used in other fibromyalgia studies [35].

Socio-demographic information: Socio-demographic characteristics were assessed once (T1). Marital status was addressed using one item

with several response options. However, the responses were for analysis purposes dichotomized into « partner » or « no partner » , where divorced, separated and widowed were included in « no partner » . The item assessing level of education fulfilled had seven response options and was dichotomized to « higher » or « lower » education, where higher education included vocational education or a higher degree. Current work status had eight response options and was for analysis purposes dichotomized to « work » or « no work». Recipients of disability benefits and retirement pension were included in the "no work" group; students were included in "work".

Statistics

Statistical analyses were performed using Statistical Package for the Social Sciences (IBM SPSS Statistics, version 25). Descriptive statistics were used to describe the sample with Chi-square statistics for categorical data and two sample t-test (two-tailed) or Mann–Whitney U test (depending on normality) for continuous data. For those with longitudinal data, comparison between T1 and T2 used McNemar's test for categorical data and either paired t-test or Wilcoxon Signed Rank test (depending on normality) for continuous data.

The impact of acceptance (CPAQ score at T1) on the primary outcome (impact of fibromyalgia on function and level of symptoms, the FIQ score, at T1 and at T2) was studied by linear regression analyses (the Enter method). The analyses were checked for multicollinearity and interaction. Possible covariates in the analysis were age (in years), work (yes/no), educational level (lower/higher), partner (yes/no), pain duration (≤10 years or not), Fibromyalgianess Score and depression (yes/no). CPAQ and all potential covariates were analyzed separately first (unadjusted), before covariates associated with p≤0.250 in the unadjusted analyses were included in an adjusted analysis to reduce potential confounding. For the longitudinal analysis with restricted statistical power, covariates in the unadjusted analysis associated with p≤0.250 were included in Model 1 and values in Model 1 not associated with p≤0.250 were omitted in Model 2. The p-value of 0.250 was chosen in order to rule out confounding factors.

Probability values below 0.05 were considered statistically significant.

Results

Characteristics of participants

In the cross-sectional study at T1, 365 (354 women, 97%) participated, with a mean (SD) age of 54 (±9.9) years, ranging from 22 to 70 years (see Table 1). In total, more than one quarter of the participants (102/365, 28%) reported quite a lot or serious depressive symptoms during the last 30 days and three quarter of the participants (284/365, 77.8%) reported their pain to have lasted more than 10 years. There were no baseline significant differences between the participants assessed only once (T1, group A) and those being assessed twice (T1 and T2, group B) regarding neither sociodemographic nor clinical variables.

Pain acceptance and fibromyalgia impact – the cross-sectional study at T1

For the total sample, the mean (SD) score of the CPAQ and FIQ total was 63.30 (17.11) and 50.58 (13.458), respectively. The linear regression analysis adjusting for age, education, work, depression and Fibromyalgianess Score found higher pain acceptance (CPAQ score) to be significantly associated with lower negative impact of fibromyalgia on function and symptoms (FIQ score) (p<0.01) (Table 2). The adjusted explained variance in the model was 46.5 %.

Pain acceptance and fibromyalgia impact – the longitudinal study (T1-T2)

The participants with longitudinal data (Group B) had a reduced mean of FIQ total at T2 (mean 49.23, SD 13.23 at T1 vs. mean 46.23, SD 11.99 at T2, p=0.01) (Table 3), with an absolute mean reduction of three FIQ points (−3.8%). Two adjusted linear regression models found higher pain acceptance (CPAQ score) at T1 associated with lower negative impact of fibromyalgia on function and symptoms (FIQ score) at T2 (Table 4). The adjusted explained variance for Model 1 and Model 2 were 45.9 and 47.0%, respectively.

Discussion

This study shows that higher pain acceptance is associated with better daily functional level and less pain and other co-occurring symptoms in patients with fibromyalgia. The positive effect of acceptance remains significant also when adjusting for potentially relevant factors. The cross-sectional findings are consistent with results from previous studies [12, 17, 24, 25, 27, 36, 37] and adds to the evidence that pain acceptance plays a part in patients with fibromyalgia as well as in other patients with chronic pain. However, the longitudinal sub-study is the first of its kind in patients with fibromyalgia. It shows that higher pain acceptance is significantly associated with better functional level and symptoms also when measurements are stretched out in time, i.e., one year. A similar study design was used in a longitudinal study on pain acceptance and patient functioning in persons with chronic pain by McCracken and Eccleston [20], where the time between assessments was in average 4 months (range 0.5– 15.0 months). In a sample of 118 patients with chronic pain, higher acceptance of pain was found to be associated with better emotional, physical, and social functioning and less

Table 1: Sample characteristics at T1 (N=365).

	n (%)	Total 365 (100)	Group A (tested at T1 only) 278 (76.2)	Group B (tested both at T1 and T2) 87 (23.8)	p-Value[a] A vs. B[b,c,d]
Gender					0.24[b]
Male	n (%)	11 (3.0)	10 (3.6)	1 (1.1)	
Female	n (%)	354 (97.0)	268 (96.4)	86 (98.9)	
Age	Years	Mean (SD) 54.03 (9.94)	54.40 (9.93)	52.86 (9.94)	0.19[c]
Marital status					0.25[b]
With partner	n (%)	281 (77.0)	218 (78.4)	63 (72.4)	
Without partner	n (%)	84 (23.0)	60 (21.6)	24 (27.5)	
Education					0.51[b]
Lower education	n (%)	136 (37.3)	101 (36.4)	35 (40.2)	
Higher education	n (%)	229 (62.7)	177 (63.7)	52 (59.7)	
Currently working[e]					0.08[b]
No current work	n (%)	182 (49.9)	131 (47.1)	51 (58.6)	
Work or under education	n (%)	178 (48.8)	142 (51.1)	36 (41.4)	
Depression[e]					0.21[b]
No or a little	n (%)	259 (71.0)	192 (69.0)	67 (77.0)	
Some or serious	n (%)	102 (28.0)	82 (29.5)	20 (23.0)	
Pain duration					0.67[b]
≤10 years	n (%)	81 (22.2)	63 (22.7)	18 (20.7)	
>10 years	n (%)	284 (77.8)	215 (77.3)	69 (79.3)	
Fibromyalgianess[e]	0–31	Mean (SD) 20.25 (5.29)	20.28 (5.18)	20.12 (5.67)	0.86[c]
SSS[e]	0–12	Mean (SD) 8.11 (2.28)	8.16 (2.31)	7.95 (2.20)	0.39[c]
WPI	0–19	Mean (SD) 12.09 (3.89)	12.07 (3.77)	12.17 (4.29)	0.71[c]
CPAQ[e]	0–120	Mean (SD) 63.30 (17.11)	63.19 (17.02)	63.64 (17.47)	0.84[d]
AES	0–66	Mean (SD) 36.51 (10.98)	36.41 (11.06)	36.83 (10.75)	0.75[d]
PWS[e]	0–54	Mean (SD) 26.53 (8.72)	26.43 (8.73)	26.82 (8.73)	0.73[d]
FIQ total	0–100	Mean (SD) 50.58 (13.76)	51.00 (13.92)	49.23 (13.23)	0.28[d]
FIQ function	0–10	Mean (SD) 3.26 (1.94)	3.31 (1.96)	3.09 (1.89)	0.45[c]
FIQ overall impact[e]	0–20	Mean (SD) 5.67 (3.63)	5.79 (3.54)	5.30 (3.90)	0.14[c]
FIQ symptoms[e]	0–70	Mean (SD) 41.82 (12.08)	42.06 (12.33)	41.06 (11.32)	0.49[d]

[a]p-Values for comparison of groups at baseline.
[b]Calculated using Chi-square Test for categorical data.
[c]Calculated using Mann-Whitney test for non-parametric variables.
[d]Calculated using independent samples T-test for parametric variables.
[e]Do not sum up to 365 due to missing information (5 missing for current work; four missing for depression; 18 missing for Fibromyalgianess and SSS; 24 missing for CPAQ and PWS; two missing for FIQ overall impact; 12 missing for FIQ symptoms).
SSS, Symptom Severity Score; WPI, Widespread Pain Index; CPAQ, Chronic Pain Acceptance Questionnaire; AES, Activity Engagement Score; PWS, Pain Willingness Score; FIQ, Fibromyalgia Impact Questionnaire.

use of medication. McCracken and Eccleston argues that pain level, mood or social setting at the time of assessment potentially influence the way a patient responds to self-report questionnaires. This may lead them to answer consistently on separate measures even though such a consistency does not reflect reality. Through choosing a longitudinal approach and extending measurements in time, these potential influences are minimized. The fact that relations between CPAQ score and FIQ score can be reproduced also after one year, therefore strengthens the evidence of the relation between acceptance and impact of illness.

Sociodemographic features of the participants in the cross-sectional study are consistent with observations from previous research of patients with fibromyalgia [38–41]. In the cross-sectional study, higher age, high educational level, work, no depression and lower degree of illness (Fibromyalgianess Score) were found associated with the outcome, lower FIQ score, i.e., better daily functional level and lower symptoms in patients with fibromyalgia. Previous studies have identified high age, low educational level and low socioeconomic status as associative factors for fibromyalgia [39, 41], and depression has been found to be a common comorbidity as well as associated with a higher impact of the illness [42].

Table 2: Linear regression of T1 measures with FIQ as outcome variable.

	Unadjusted			Adjusted[a]		
	Unstandardized B (95% CI)	Standardized β	p-Value	Unstandardized B (95% CI)	Standardized β	p-Value
Age in years	−0.28 (−0.42; −0.14)	−0.20	<0.01	−0.23 (−0.35; −0.11)	−0.16	<0.01
Higher education (vs. lower)	−3.90 (−6.80; −0.99)	−0.14	<0.01	−2.78 (−5.17; −.38)	−0.10	0.02
Current working (vs. not)	−7.21 (−9.97; −4.45)	−0.26	<0.01	−5.22 (−7.62; −2.83)	−0.19	<0.01
With partner (vs. without)	−0.45 (−3.82; 2.92)	−0.01	0.80			
Pain duration >10 years (vs. not)	0.82 (−2.59; 4.23)	0.03	0.64			
Fibromyalgianess	1.24 (1.0; 1.49)	0.48	<0.01	0.69 (0.46; 0.92)	0.26	<0.01
Depression (vs. not)	12.68 (9.97; 15.57)	0.41	<0.01	7.39 (4.83; 9.96)	0.24	<0.01
CPAQ	−0.41 (−0.48; −0.34)	−0.52	<0.01	−0.26 (−0.33; −0.20)	−0.33	<0.01
Adjusted R^2				0.465		

[a]N=315.

Table 3: T2 repeated measures with comparison from T1 (N=87).

		n (%)	Group B 87 (23.8)	p-Value B T1 vs. B T2[a,b,c]
Depressive symptoms[d]				0.146[a]
	No or a little	n (%)	71 (81.6)	
	Quite a lot or serious	n (%)	14 (16.1)	
Fibromyalgianess[d]	0–31	Mean (SD)	19.83 (5.05)	0.20[b]
SSS[d]	0–12	Mean (SD)	7.76 (2.25)	0.08[b]
WPI	0–19	Mean (SD)	11.93 (4.02)	0.47[b]
FIQ total	0–100	Mean (SD)	46.23 (11.99)	0.01[b]
FIQ function[d]	0–10	Mean (SD)	2.74 (1.91)	0.02[c]
FIQ overall impact[d]	0–20	Mean (SD)	5.69 (3.78)	0.74[c]
FIQ symptoms[d]	0–70	Mean (SD)	37.69 (10.56)	<0.01[b]

[a]Calculated using McNemar's test for related samples.
[b]Calculated using paired t test.
[c]Calculated using Wilcoxon signed rank test.
[d]Do not sum up to 87 due to missing information (two missing for depression; four missing for Fibromyalgianess and SSS; one missing for FIQ function; two missing for FIQ overall impact).
SSS, Symptom Severity Score; WPI, Widespread Pain Index; FIQ, Fibromyalgia Impact Questionnaire.

The mean values of FIQ total do not change substantially from T1 to T2. Minimal clinically important difference (MCID) in FIQ is estimated to be around 14% [43], but the mean values changed much less here, with only a 3% reduction from T1 to T2. The lack of change could be expected, given the fact that no intervention was introduced.

In addition, the follow-up time was only one year, not a long time in the perspective of chronic illness (most of the respondents, 77.8%, had been ill for more than 10 years). Pain is considered to be rather stable over time in chronic pain populations, with day-to-day fluctuations in function and impairment rather than large changes over time [44, 45].

Strengths and limitations

Some apparent strengths are that the sample size of the cross-sectional study is relatively large, and the longitudinal design with a follow-up group providing repeated measures makes this study different than previous studies on the topic. Fibromyalgia is a condition not yet fully understood, and it is of great clinical interest to find out more about the factors influencing this condition in order to better help a patient group who suffers a large burden of illness [46]. The questionnaires used, FIQ and CPAQ, are established as valid measures internationally and are widely used in fibromyalgia research. However, FIQ has been revised, but this newer FIQ-R version is not translated into Norwegian. Nevertheless, according to Bennett et al. the FIQ revised (FIQ-R) has a good correlation with the original FIQ, thus providing the ability to compare the results of studies using the older version with studies using the revised version [47].

Participants in the cross-sectional study were from all regions of Norway, both urban and rural areas, thus strengthening the assumption that the respondents are representative for the fibromyalgia population in the country. Due to practical reasons, respondents in the follow-up group were from the Trondheim and Bergen regions only. However, the follow-up group did not differ

Table 4: Linear regression of longitudinal measures (T1-T2) with FIQ at T2 as outcome variable.

	Unadjusted			Adjusted Model 1[a]			Adjusted Model 2[b]		
	Unstandardized B (95% CI)	Standardized β	p-Value	Unstandardized B (95% CI)	Standardized β	p-Value	Unstandardized B (95% CI)	Standardized β	p-Value
Age in years	-0.36 (-0.61; -0.112)	-0.30	<0.01	-0.07 (-0.28; 0.15)	-0.06	0.54			
Higher education (vs. lower)	-2.94 (-8.15; 2.26)	-0.12	0.26						
Currently working (vs. not)	-2.67 (-7.86; 2.52)	-0.11	0.31						
With partner (vs. without)	-5.18 (-10.83; 0.46)	-0.19	0.07	-2.88 (-7.29; 1.56)	-0.11	0.20	-2.69 (-6.95; 1.57)	-0.10	0.21
Pain duration > 10 years (vs. not)	-1.45 (-7.79; 4.89)	-0.05	0.65						
Fibromyalgianess	0.62 (0.16; 1.07)	0.29	<0.01	0.14 (-0.26; 0.53)	0.06	0.49			
FIQ total T1	0.57 (0.08; 0.42)	0.63	<0.01	0.38 (0.19; 0.56)	0.41	<0.01	0.41 (0.24; 0.57)	0.45	<0.01
Depression (vs. not)	10.20 (4.49; 15.90)	0.36	<0.01	5.61 (0.75; 10.48)	0.20	0.02	5.08 (0.37; 9.78)	0.18	0.03
CPAQ	-0.33 (-0.46; -0.20)	-0.48	<0.01	-0.18 (-0.31; -0.06)	-0.27	<0.01	-0.20 (-0.32; -0.08)	-0.29	<0.01
Adjusted R²				0.472			0.474		

[a]n=81.
[b]n=83.

statistically from the baseline group on any measures, suggesting that they were representative for the baseline population.

Although having a longitudinal component, the study remains observational without any intervention or control group. It is thus not possible to establish cause and effect between the variables. Information about what kind of treatment, if any, the respondents in the longitudinal study received for their fibromyalgia was not collected, giving potential bias of the FIQ score. Change in treatment during the follow-up period could potentially also influence the FIQ score at T2. In addition, information about comorbidity was not collected. Even though it was explicitly stated in the questionnaire that the questions regarded fibromyalgia only, it is imaginable that it can be difficult for the respondent to separate the illness impact of fibromyalgia from other relevant diseases. Older age makes you more prone to comorbidity, and an upper age limit at 70 years old for inclusion of participants was therefore chosen in order to reduce confounding.

Depression was measured through a single-item question with four response options, and dichotomization was performed. One might question why the dichotomization of depressive symptoms into "no or a little" and "some or serious" was chosen over "no" vs. "a little, some or serious". The same dichotomization was performed in a validation study by Reme et al., showing a much better specificity when choosing this approach than the four response option (81% specificity for "no or a little" vs. "some or serious"; 56% specificity for "no" vs. "a little, some or serious") [34]. The use of a more thorough depression assessment such as the Hospital Anxiety and Depression Scale (HADS) would have given more nuanced information about depressive symptoms as well as information about anxiety. The short screening was chosen in order to not make the questionnaire too long for the respondents.

The longitudinal data were obtained for only 24% of baseline participants. A higher number of respondents in the follow-up group would have made the longitudinal analysis more robust with more statistical strength. Pain duration was assessed using an 8-point ordinal scale but was dichotomized due to lack of statistical strength. Even so, a continuous assessment of paid duration would have provided more nuanced information.

Inclusion of participants was based on a self-report question about having the fibromyalgia diagnosis, derived from the Nord-Trøndelag Health Study (HUNT 3) [28]. The same question has been used as inclusion criteria in epidemiological fibromyalgia research based on HUNT data [48, 49]. We cannot guarantee that not all the

respondents would satisfy the clinical diagnostic criteria, given that we lack information about their diagnostic work-up. The epidemiological approach for inclusion was chosen because this study is based on the same data collection as an ongoing validation study of the revised 2016 diagnostic criteria [50].

Further perspectives

Acceptance of pain is a key aspect in pain management, important for functioning as well as possible when you have a chronic pain disease. More knowledge of these potential positive effects among clinicians when meeting patients with fibromyalgia is crucial. Through this, clinicians can educate their patients on the benefits of "letting the pain be pain", trying not to fight it but attempting to continue with meaningful daily activities despite their chronic illness. Future research could preferable include more male fibromyalgia patients, since the predominance of females in previous studies is large and does not reflect what is now believed to be the true gender distribution in fibromyalgia. In an unbiased study using the 2016 diagnostic criteria, the female proportion was found to be less than 60% [51].

To further explore the potential clinical benefits of acceptance in fibromyalgia, the next natural step would be a randomized controlled trial (RCT) with an acceptance-based therapy as the intervention. A systematic review from 2019 on mindfulness- and acceptance-based therapy for fibromyalgia included three such RCTs in their meta-analyses [52]. All of them had an Acceptance and Commitment Therapy (ACT) program as intervention, and measured FIQ. Two of the studies also measured CPAQ [53, 54]. These two showed a relatively large effect size on FIQ reduction in the intervention group compared to treatment as usual, as well as an increase in CPAQ. However, study samples were small, and the systematic review concludes that the effect of acceptance-based interventions in fibromyalgia is promising, but uncertain. Further research is therefore warranted, with robust intervention-based study designs and adequately large study samples.

Conclusion

This study shows that higher pain acceptance is associated with better functional level and less symptoms in fibromyalgia patients, both cross-sectionally and when measurements are separated in time. Our cross-sectional results are consistent with previous research on fibromyalgia populations and adds to the body of evidence that pain acceptance plays a key role in day-to-day function for this patient group. The longitudinal analysis strengthens this assumption even further. Future research should include intervention-based studies with ACT or other acceptance-related therapies as target of intervention.

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