

## Original Article

# Sollicitous and invalidating responses are associated with health-care visits in fibromyalgia

Johanna E. Vriezekolk<sup>1,\*</sup>, Anke J. F. Peters<sup>1,\*</sup>, Cornelia H. M. van den Ende <sup>1</sup> and Rinie Geenen<sup>2</sup>

## Abstract

**Objectives** Health-care use in FM is substantial. Besides the severity of the disease and psychological factors, previous research suggests that the social environment can influence patients' health-care use. In this study, we describe health-care use in patients with FM and investigate the relationship of social responses of the partner and family with health-care use.

**Methods** Cross-sectional data of 280 patients with FM were analysed. Sociodemographic variables, health-status variables, health-care use, partner's solicitous and punishing responses, and invalidation (i.e. discounting and lack of understanding) by family were assessed. Health-care use was defined as the number of visits to physicians and health professionals. Associations of independent variables with health-care use were examined using univariate and hierarchical regression analyses.

**Results** In the preceding 6 months, 99% of the patients visited at least one physician and 66% visited at least one health professional. The mean (s.d.) total health-care visits and the number of different disciplines consulted were 18.5 (17.7) and 3.6 (1.7), respectively. Being female, paid employment, having a co-morbid condition, a higher severity of FM, more partner's solicitous responses and more invalidating responses by family were univariately associated with visits to a physician. Having a co-morbid condition, severity of FM and invalidation by family were uniquely associated with visits to a physician. No other associations were found.

**Conclusion** Therapeutic attention to patients' close social environment might be a useful approach to improve health-related outcomes, including health-care use, in patients with FM.

**Key words:** health-care use, health-care resources, social environment, fibromyalgia, invalidation, solicitous responses, punishing responses

## Key messages

- Responses from the close social environment are associated with health-care visits in FM.
- Invalidating responses from the family uniquely contribute to more visits to physicians.
- Sociodemographic variables, health status and social responses were not associated with visits to health professionals.

<sup>1</sup>Department of Rheumatology, Sint Maartenskliniek, Nijmegen and <sup>2</sup>Department of Psychology, Utrecht University, Utrecht, The Netherlands

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Correspondence to: Johanna E. Vriezekolk, Department of Rheumatology, Sint Maartenskliniek, PO Box 9011, 6500 GM, Nijmegen, The Netherlands. E-mail: j.vriezekolk@maartenskliniek.nl

\*Johanna E. Vriezekolk and Anke J. F. Peters contributed equally to this study.

## Introduction

FM is a chronic pain condition, characterized by widespread pain and other symptoms including fatigue, unrenewing sleep and cognitive difficulties. FM affects patients' daily functioning and has a considerable societal impact [1]. Health-care use and costs have been estimated to be up to three times higher in FM than in the general population [2] and two times as high compared with other

musculoskeletal disorders, such as osteoporosis, OA and back pain [3]. Health-care use remains relatively stable after diagnosis, comparable to the level before diagnosis [4]. Substantial health-care use in FM might be attributable to the significant burden of the illness, the absence of a cure, and limited efficacious treatment options [5]. Use of health-care services is desirable to the extent that it reduces symptoms and improves functioning and well-being, but it is undesirable if it predominantly reflects false hope and worries that are not taken away. A better understanding of factors that contribute to health-care use can help to develop strategies to optimize health-care resources and ultimately might lead to improved quality of care for patients with FM.

Disease severity and perceived health status have been shown to be main determinants of health-care use in patients with a chronic disease [6]. In FM, pain, disability and co-morbid conditions [7, 8], age [9] and coping ability [10] were related to health-care use. The close social environment of patients with FM is an obvious determinant of health-care use that has hardly been examined. According to operant conditioning theory, partner responses influence pain behaviour and well-being in patients with chronic pain [11]. Solicitous responses of partners to pain behaviour, such as expressing sympathy or offering assistance, are associated with higher pain reports and worse physical functioning in patients with chronic pain, including FM [12]. This might imply that a partner with a habitual solicitous style reinforces pain behaviour, leading to an increased use of health care by the patient [13]. The relationship between punishing responses of the partner and pain behaviour is less clear [14]. Although a partner with a habitual punishing style will probably not encourage health-care use, punishing responses might aggravate pain and other symptoms, enhancing health-care use [13].

Invalidation or lack of understanding from the close social environment (e.g. family members) is another social factor that might contribute to health-care use in FM. A recent study showed that invalidating responses from medical professionals was associated with more hospital visits in FM [15]. According to the social support theory, social support promotes health and buffers the impact of stress on health [16]. The term 'invalidation' includes non-acceptance by others, misunderstanding, rejection, disbelief, stigmatization, and suspicion that the problem is exaggerated or psychological [17]. Invalidation and low social support may be associated with more health-care use, because they are associated with poorer physical and mental health [18–20]. Finding an association between responses of the close social environment and health-care use would imply that health-care utilization can potentially be influenced through educating the patient with FM and the close social environment [21]. The social environment might be particularly relevant in the case of high illness severity, which is a situation in which social support is needed more as a protective factor. Therefore, in line with the social support theory, we hypothesized that health-care use is particularly high in

patients with high FM severity who perceive more lack of understanding and more discounting and punishing responses in the close social environment.

The objective of this study was to describe health-care use, specifically health-care visits, in patients with FM and to investigate the relationship of social responses of the partner and family with health-care visits by patients. Specifically, we hypothesized that solicitous and punishing responses from the partner, and invalidating responses (discounting and lack of understanding) from the family are associated with more health-care visits, particularly when disease severity is high.

## Methods

### Participants

Two-hundred and eighty patients with probable FM, newly referred to the rheumatology outpatient clinic of the Sint Maartenskliniek, The Netherlands, were recruited between December 2011 and May 2013. Of these patients, 43% had received an earlier diagnosis of FM (average time since diagnosis: 6.9 years, s.d. = 6.4), whereas others were newly diagnosed. For the present study, patients were eligible when they: (1) had a rheumatologist-certified diagnosis of FM; (2) were 18 years or older; and (3) were able to read and write Dutch. The ethical Review Board of the University Medical Centre, Nijmegen exempted the study (protocol reference number: 2011/271) from ethical approval according to the Medical Research Involving Human Subjects Act. All patients gave informed consent.

### Study procedure and design

Weekly, the researcher received a list of eligible patients with a rheumatologist-certified diagnosis of FM. These patients were contacted by the researcher, informed, and invited to participate in a longitudinal study investigating determinants of health-care use. The present study uses baseline data of this longitudinal study. Patients filled out self-report questionnaires to assess sociodemographic characteristics, health-related variables, social variables and health-care use.

### Measures

#### *Sociodemographic and health-related variables*

The parameters assessed were age, sex, education level, having a partner, employment status, and the following 20 common co-morbidities: pulmonary diseases, sinusitis, cardiac diseases, high blood pressure, cardiovascular accident, stomach ulcer, chronic bowel dysfunction, diabetes mellitus, thyroid dysfunction, epilepsy, vertigo, migraine, severe skin disease, malignant disease, depression, personality disorder, anxiety disorder, attention deficit disorder, bipolar disorder and eating disorder. Patients indicated which of the co-morbid conditions they had; co-morbidities not included in the list were added in response to an open question.

### Severity of FM

The fibromyalgia impact questionnaire was used to assess severity [22]. This self-report instrument comprises 10 items relating to large muscle tasks, feeling well, work absence, work difficulty, pain, fatigue, morning tiredness, stiffness, anxiety and depression, on scales from 0 to 10. The Dutch fibromyalgia impact questionnaire has good validity and internal consistency [23]. In this study, Cronbach's  $\alpha$  of the total score was 0.81.

### Solicitous and punishing responses by the partner

To assess perceived solicitous and punishing responses by the partner, the Dutch version of the 14-item 'significant other response scale' of the West Haven-Yale multidimensional pain inventory (WHYMPI) was used [24, 25]. Patients record the frequency with which they perceived their partner responses as solicitous, distracting or punishing on a six-point scale (from 'never' to 'very frequently'). Only the solicitous and punishing subscales were included in the study, because our hypotheses focused on these partner responses. Responses are coded as either punishing (e.g. 'express irritation at me', four items) or solicitous (e.g. 'takes over my jobs or duties', six items). The questionnaire has good validity and internal consistency [25]. In this study, Cronbach's  $\alpha$  for the solicitous and punishing subscales was 0.80 and 0.87, respectively.

### Perception of invalidation by the family

To assess invalidation by the family, the two family subscales of the illness invalidation inventory (3\*I) were used [26]: 'discounting' (e.g. 'my family thinks I should be tougher', five items) and 'lack of understanding' (e.g. 'my family understands the consequences of my health problem or illness', three items, reversed item scoring). Patients indicated on a five-point scale (from 'never' to 'very often') how often during the past year their family had reacted to them in the described way. The 3\*I has good validity and internal consistency [26]. In this study, Cronbach's  $\alpha$  for the discounting and lack of understanding subscales was 0.90 and 0.85, respectively.

### Health-care visits

Health-care use was collected using self-report registration forms with a 6 month recall format. It comprised consultations with medical specialists, health professionals, diagnostic procedures, medication use, hospital and rehabilitation admissions. Health-care use was defined as the number of visits to physicians (including general practitioner, rheumatologist, orthopaedist, specialists such as a cardiologist, and an open question to add a specialist that was not mentioned) and number of visits to health professionals (including physical therapist, occupational therapist, psychologist and complementary practitioners).

### Statistical analysis

Descriptive statistics were computed for all study variables. Given that three patients had extremely high scores on health-care visits (i.e. standardized residuals  $>3.29$  [27]),

all analyses were performed with and without these patients. As the results of these analyses did not differ significantly, the results are presented with inclusion of these three patients. Student's unpaired *t*-tests were performed to examine whether patients with or without a partner differed significantly. To examine the association between social responses and health-care visits, separate series of hierarchical regression analyses were conducted, with the dependent variable, health-care visits, measured as: (1) number of visits to physicians; and (2) number of visits to health professionals. Given that only a minority of the patients visited complementary practitioners, these were not included in the analyses. In main analyses, first, univariate linear regression analyses were performed to examine the association between the dependent and independent variables. Besides perceived responses of partner and family, and informed by the literature, the following sociodemographic and health-related independent variables were tested: age, sex, having a partner (yes/no), education level, paid employment (yes/no), having co-morbidities (yes/no), and severity of FM. Second, independent variables that showed a univariate association with the health-care visits ( $P < 0.10$ ) were entered into a hierarchical regression analysis in the following order: sociodemographic variables (step 1), health-related variables (step 2), and perceived social responses (step 3). Third, to examine a possible moderator effect on health-care visits, the variables severity of FM and perceived social responses were centred, and their interaction terms were computed and entered as step 4 in the regression analysis. Given that transformation of the skewed dependent variables (i.e. 2.58 and 2.16 for number of visits to physicians and number of visits to health professionals, respectively) did not significantly change the results of the regression analyses, the results are presented without transformation of the dependent variables. Using the variance inflation factors, no indication for multicollinearity was found (variance inflation factors  $<10$ ) [28]. Two separate hierarchical regression models were built per dependent variable. Although discounting and lack of understanding were highly correlated ( $r = 0.69$ ) in this study, the variables were shown to be different constructs in factor analyses [26]. Moreover, lack of understanding was (more clearly than discounting) negatively correlated with social support; both invalidation variables were additively associated with mental health, and only discounting was significantly associated with patients' physical health [19]. The total number of missing values per variable did not exceed 3% of the total data, except for the perceived responses of the partner (22% missing) as expected. All statistical analyses were performed using Stata/IC v.13.0 software. The significance level was set at  $P < 0.05$ .

## Results

### Participants

Table 1 shows the sample characteristics. The majority of the patients had a partner (78%) and one or more

**TABLE 1** Characteristics of the study sample ( $n = 280$ )

Characteristics	
Female, $n$ (%)	267 (95)
Age, mean (s.d.), years	42.6 (11.8)
Education level, $n$ (%) <sup>a</sup>	
Low	122 (44)
Middle	95 (34)
High	55 (20)
Having a partner, $n$ (%)	219 (78)
Paid employment, $n$ (%)	143 (51)
Having co-morbidities, $n$ (%) <sup>b</sup>	218 (78)
Number of co-morbidities, $n$ (%)	
1–2	124 (44%)
3–4	65 (23%)
$\geq 5$	29 (10%)
Health status	
Severity of FM, mean (s.d.) <sup>c</sup>	59.1 (15.5)
Perceived social responses ( $n = 227$ )	
Solicitous partner response, mean (s.d.) <sup>d</sup>	3.3 (1.3)
Punishing partner response, mean (s.d.) <sup>d</sup>	1.1 (1.3)
Discounting family, mean (s.d.) <sup>e</sup>	2.2 (1.0)
Lack of understanding family, mean (s.d.) <sup>e</sup>	2.7 (0.9)

<sup>a</sup>Education level: low education,  $\leq 12$  years; middle, 13–14 years; higher,  $\geq 15$  years.

<sup>b</sup>Co-morbidities were, for example, depression, migraine, pulmonary diseases and/or sinusitis.

<sup>c</sup>FIQ = fibromyalgia impact questionnaire (theoretical range, 0–100).

<sup>d</sup>Multidimensional pain inventory (theoretical range, 0–6).

<sup>e</sup>Illness invalidation inventory (theoretical range, 1–5).

co-morbidities (78%). Approximately half of the patients were employed, and 44% of the patients had received lower education. The mean (s.d.) age of patients with and without a partner differed significantly, at 43.9 (11.0) vs 37.8 (13.4) years ( $t = -3.59$ ,  $P < 0.01$ ). No other differences between patients having and not having a partner were found.

### Health-care visits

Median (interquartile range) health-care visits are displayed in Table 2. In the past 6 months, 99% of the patients had visited at least one physician (mostly general practitioners) and 66% of the patients had visited at least one health professional (mostly physical therapists). The mean (s.d.) number of visits to physicians was 8 (0.7) and to health professionals 10.5 (15.4). The mean (s.d.) number of total health-care visits was 18.5 (17.7). The mean number (s.d.) of different disciplines consulted was 3.6 (1.7).

### Factors associated with health-care visits

#### Visits to physicians

Table 3 shows the univariate associations of visits to physicians with sociodemographic variables, health-status variables and social responses. Being female, in paid employment, having a co-morbid condition, FM

severity, partner's solicitous responses, discounting and lack of understanding by the family were positively associated with visits to physicians ( $P$  values  $< 0.05$ ).

Table 4 shows the results of the hierarchical regression analyses. Having a co-morbid condition, higher FM severity, more lack of understanding and more discounting by the family were independently associated with more visits to physicians while taking the other variables into account. No significant interactions between the severity of FM and the social responses variables were found. The total models explained 14 and 12% of the variance for discounting and lack of understanding, respectively.

#### Visits to health professionals

None of the independent variables was associated with visits to health professionals in univariate analyses ( $P < 0.10$ ; Table 3), and therefore no hierarchical regression analyses were conducted.

## Discussion

Our cross-sectional study showed that health-care visits in Dutch patients with FM were substantial and involved a range of health-care providers. Moreover, our study showed a relationship between social responses and health-care use in patients with FM. Perceived solicitous responses from the partner and invalidating responses from family members were associated with more patient's visits to physicians, but not to health professionals. No relationship was found between perceived punishing responses from the partner and the patient's health-care visits. This study confirms our hypotheses, in part.

In our study, patients with FM visited several health-care providers before participation in the study. In line with others [29], the general practitioner, rheumatologist and physical therapist were most frequently visited. The average number of eight visits to physicians in the present study is comparable to previous research in FM [30]. The reported number of visits to the physical therapist was similar to that in a Spanish cohort of patients with FM recruited from rheumatology clinics [31]. Taken together, patients with FM display considerable health-care use before visiting a specialized centre, which might reflect a search for explanation, validation and relief of symptoms [32].

The key question in this study was whether responses from the close social environment of patients were related to health-care visits in patients referred to secondary care. First, invalidation by family members was examined. To our knowledge, ours is the first study to show an association between invalidation by the family and health-care use. Higher levels of discounting and lack of understanding by family members were associated with more patient's visits to physicians, even after controlling for sociodemographic and health-related characteristics. Although our recent study showed that invalidation by the family was not a predictor for

**TABLE 2** Percentage of patients and number of visits to health-care providers

Health-care visits	Contacted in past 6 months, <i>n</i> (%)	Number of visits, if at least one, <sup>a</sup> median (25th–75th percentile)
<b>Physicians</b>	277 (99.0)	6 (4–10)
General practitioner	255 (91.7)	4 (2–6)
Rheumatologist	244 (87.1)	2 (1–2)
Orthopaedist	36 (12.9)	2 (1–3)
Neurologist	32 (11.4)	2 (1–2)
Internist	20 (7.1)	2 (1–2)
Rehabilitation physician	17 (6.1)	1 (1–3)
Cardiologist	14 (5.0)	2 (1–2)
Psychiatrist	12 (4.3)	3 (1–6)
Otolaryngologists	13 (4.6)	2 (1–4)
Other physicians <sup>b</sup>	58 (20.7)	2 (1–4)
<b>Health professionals</b>	185 (66.1)	11 (5–21)
Physical therapist	145 (51.8)	10 (5–18)
Psychologist	57 (20.4)	5 (3–7)
Manual therapist	29 (10.4)	6 (3–10)
Exercise therapist	16 (5.7)	8 (5–10)
Occupational therapist	13 (4.6)	3 (1–5)
Hydrotherapist	10 (3.6)	17 (2.5–25.5)
Chiropractor	11 (3.9)	3 (1–4)
Haptotherapist	7 (2.5)	5 (4–17)
Other health professional <sup>c</sup>	9 (3.2)	2.5 (1.5–4.5)
Complementary and alternative medicine	60 (21.4)	4 (1.5–8)

<sup>a</sup>Number of visits is based on patients with at least one visit.

<sup>b</sup>Other physicians included, for instance, the gynaecologist, pulmonologist and dermatologist.

<sup>c</sup>Other health professionals were mostly podiatrists and (psychosomatic) nurses.

**TABLE 3** Univariate regressions of health-care visits with sociodemographic characteristics, health-status variables and social responses

Independent variable	Visits to physicians <sup>a</sup>			Visits to health professional <sup>a</sup>		
	B (95% CI)	<i>P</i> -value	<i>P</i> -value	B (95% CI)	<i>P</i> -value	<i>P</i> -value
<b>Sociodemographics</b>						
Age	−0.02 (−0.08, 0.04)	−0.04	0.43	0.02 (−0.12, 0.16)	0.01	0.80
Female gender	2.86 (0.87, 4.84)	0.09	<0.01	1.09 (−6.19, 8.37)	0.01	0.77
Having a partner	1.03 (−0.54, 2.60)	0.06	0.20	1.89 (−2.05, 5.83)	0.05	0.95
Education level	−0.35 (−1.33, 0.63)	−0.04	0.48	1.19 (−0.10, 3.38)	0.06	0.28
Paid employment	−1.86 (−3.51, −0.21)	−0.13	0.03	0.12 (−3.50, 3.74)	0.004	0.95
<b>Health status</b>						
Having a co-morbid condition	3.09 (1.71, 4.47)	0.18	<0.01	2.16 (−1.50, 5.82)	0.06	0.25
Severity of FM	0.10 (0.04, 0.16)	0.21	<0.01	0.01 (−0.09, 0.11)	0.01	0.80
<b>Social responses</b>						
Solicitous responses of partner	0.76 (0.03, 1.49)	0.13	0.04	0.79 (−0.75, 2.33)	0.06	0.31
Punishing responses of partner	−0.09 (−0.90, 0.72)	−0.02	0.82	−0.91 (−2.21, 0.39)	−0.07	0.17
Discounting by the family	1.76 (0.80, 2.72)	0.24	<0.01	0.22 (−1.65, 2.09)	0.01	0.81
Lack of understanding by the family	1.00 (0.07, 1.93)	0.13	0.03	−1.27 (−3.02, 0.48)	−0.08	0.16

<sup>a</sup>For each independent variable, the sample size ranged from  $n=272$  to  $n=280$ , except for solicitous responses of the partner,  $n=219$ , and punishing responses of the partner,  $n=218$ . B: regression coefficient;  $\beta$ : standardized regression coefficient.

recurrent secondary health-care use during an 18-month interval [33], experimental observations suggest that invalidation amplifies pain, which might be a route through which invalidation could impact health-care use.

Research has suggested that feelings of social rejection and pain share similar neuronal brain regions, such as the dorsal anterior cingulate cortex and anterior insula. Heightened activity of the dorsal anterior cingulate



**TABLE 4** Hierarchical regressions predicting visits to physicians from sociodemographic characteristics, health-status variables and social responses

Visits to physicians	Total R <sup>2</sup>	R <sup>2</sup> change	P-value
<b>Model 1: discounting</b>			
Step 1: sociodemographics	0.03		0.06
Female gender		0.10	0.11
Paid employment		0.01	0.86
Step 2: health status	0.08	0.06	<0.01
Having a co-morbid condition		0.15	0.03
Severity of FM		0.14	0.07
Step 3: social responses	0.14	0.06	<0.01
Solicitous partner		0.06	0.37
Discounting by the family		0.24	<0.01
Step 4: severity of FM×social responses	0.14	0.00	0.83
Severity of FM×solicitous partner		0.04	0.54
Severity of FM×discounting by the family		-0.00	0.98
<b>Model 2: lack of understanding</b>			
Step 1: sociodemographics	0.03		0.06
Female gender		0.11	0.11
Paid employment		-0.02	0.82
Step 2: health status	0.09	0.06	<0.01
Having a co-morbid condition		0.15	0.03
Severity of FM		0.17	0.02
Step 3: social responses	0.12	0.03	0.02
Solicitous partner		0.10	0.13
Lack of understanding family		0.16	0.02
Step 4: severity of FM×social responses	0.12	0.00	0.93
Severity of FM×solicitous partner		0.03	0.71
Severity of FM×lack of understanding family		0.01	0.92

β: standardized regression coefficient.

cortex has been linked to increased levels of pain distress (the affective component of pain experience) [34]. Other studies have demonstrated that patients with chronic pain are more sensitive to social pain [35], and that those who tend to be more sensitive to rejection also have more somatic symptoms, including pain [36]. This suggests that invalidating responses by family, such as rejection, disbelief and stigmatization might contribute to patients’ experience of pain and, in turn, might motivate patients to seek validation or relief for their symptoms from health-care providers. Although the causal relationships between invalidation and health-related outcomes are not yet fully understood, perhaps mindfulness meditation techniques, such as compassion therapy and loving-kindness meditation, promoting acceptance and self-compassion, might help patients to cope with invalidation [37, 38]. Another strategy to increase patients’ well-being and reduce health-care use might be to decrease invalidation by the family by informing them in educational campaigns about FM and the burden of it for patients.

Second, responses by the partner were examined. Perceived solicitous responses from the partner, such as offering help and taking over work chores, were associated in univariate analyses with more physician-related visits. This finding fits with previous findings suggesting that a helpful partner may facilitate

health-care use possibly by ‘fuelling’ pain behaviour, leading to worse perceived health status [12]. Research shows that the associations of patients’ perceived social responses with real social responses and partners’ reported social responses to pain behaviour are small to moderate [39–41]. This reflects that couples differ in the extent to which negative social responses depend on the perceiver or provider. However, even in patients where negative social responses are predominantly in the eye of the beholder, benefits may be expected from educating the close and more distant environment not to deny the existence of symptoms that cannot be observed, not to lecture or overprotect, to acknowledge the disorder, and to help, comprehend and provide emotional support to the person. In multivariate analysis, the relationship between solicitous responses from the partner and physician visits disappeared, whereas discounting and lack of understanding remained independently associated with physician visits. One study showed a strong inverse association between lack of understanding and social support ( $r = -0.53$ ), indicating overlapping constructs [19]. Discounting was related to, but more distinct from social support. Our findings are in line with these latter observations, suggesting that perceived invalidating responses from the family are a more potent driver for health-care use than the responses of a helpful partner. It is noteworthy that we

did not find an association between perceived punishing responses from the partner and visits to physicians, which might be attributable to the low number of patients experiencing punishing responses. Ecological momentary assessment studies suggest that negative social responses are concurrently associated with increased symptom severity and distress, but the association of negative social responses with health at later assessments remains unclear [42, 43]. Future longitudinal studies are needed to examine temporal associations and potential mediators of social responses and health-related outcomes, including health-care use.

Contrary to visits to physicians, social responses from neither the partner nor family members were related to health professional visits. Perhaps cognitive variables are more important. Some individuals with chronic musculoskeletal pain keep a biomedical explanatory model of disease and illness [44]. Attributing the cause of symptoms to a physical defect may hamper lifestyle and (self)management changes potentially under supervision of a health professional. Also, family members may attribute the illness to a medical cause and encourage patients to consult physicians. Given that none of the sociodemographic characteristics, health-related variables or social variables in our study was associated with visits to health professionals, more research is needed to gain insight into factors that influence these visits. Treatment beliefs have been found to be associated with health-care use [4]. If patients have low expectations about the beneficial effects of non-pharmacological care [45], then it is less likely that they will visit a health professional. Qualitative studies exploring the attitudes and beliefs of patients' close social environment regarding non-pharmacological treatment, such as patient education, lifestyle interventions and behavioural interventions, might elucidate additional contextual barriers that can influence patients' health-care-seeking behaviour, in particular for non-pharmacological treatment.

In the present study, the explained variance of the models (visits to physicians as the dependent variable) was modest, at 14 and 12%, respectively. However, the independent contributions of the social variables (6 and 3%, respectively) to health-care visits were comparable to the health-related variables, i.e. having a co-morbid condition and the severity of FM. Methodological limitations preclude firm inferences about the relevance of social responses on health-care use. Intervention studies are needed to examine whether modifying social responses is effective in decreasing health-care use. Results of psychosocial interventions for decreased health-care use have been found to be promising [46].

Our findings should be interpreted cautiously, in light of the study limitations. First, the cross-sectional design of our study precludes firm inferences about the directionality of the relationship between social responses and health-care use. Longitudinal study designs are needed to examine whether social responses influence patients' health-care use directly or indirectly through other variables. In our recent paper, the longitudinal relationship of

cognitive-behavioural and social factors with health-care use showed no direct association between the close social environment (e.g. invalidation and spousal responses) and recurrent secondary health-care use [33]. It is plausible that social responses influence health-care use indirectly through increased pain or reinforcement of disability. Future mediational studies are needed to test such assumptions. Second, patients were selected from one specialized hospital and therefore the patients might not be fully representative of the general FM population. Also, recruitment bias might have occurred, because we enrolled treatment-seeking patients who were willing to participate in a longitudinal study. Both the selection bias and recruitment bias could have led to an overestimation of health-care use. However, our findings were in line with previous research in clinical samples. Third, health-care use data were collected through self-reported questionnaires. Recall bias could have led to inaccurate data. Although validation of patient-reported data against data from medical or administrative records is a preferred method, research shows a good concordance between self-reported and registered utilization of health care [47]. Finally, although much effort was undertaken to keep the time between diagnosis and data collection of health-care use as short as possible, a portion of the health-care services might have been consumed before receiving a certified diagnosis of FM from one of our rheumatologists.

Overall, the association of perceived responses from the partner and family with health-care use is small. More invalidating responses by family (i.e. discounting and lack of understanding) are uniquely associated with more visits to physicians in FM, but not with health professional visits. Although the relationship between invalidation and health-related outcomes is not yet fully understood, therapeutic attention to the patient's experience of invalidation and targeting invalidation by patients' close social environment might be useful approaches to improve health-related outcomes, including health-care use, in patients with FM.

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