

Observational Studies

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Demographic and clinical factors associated with psychological wellbeing in people with chronic, non-specific musculoskeletal pain engaged in multimodal rehabilitation: –a cross-sectional study with a correlational design

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Abstract

Objectives: To investigate which demographic and clinical factors were associated with psychological wellbeing in working-aged people in multimodal rehabilitation for musculoskeletal disorders.

Methods: 116 participants met the criteria for inclusion: persistent or intermittent pain for at least three months; pain that adversely impacts daily life; potential for active change despite pain; no co-morbidity or condition that will hinder participation in the rehabilitation program. Primary outcome was psychological wellbeing and independent measures were general, physical and mental health, pain intensity, limitations in daily life, depression and sleep.

Results: The results show decreased odds of psychological wellbeing for persons rating high on depression. The results remained significant after adjusting for sex and age. Being a woman increased the odds of high psychological wellbeing. Logistic regression showed that psychological wellbeing was

not significantly associated with pain intensity; sleep; functional limitations; general, physical, or mental health. None of the other independent variables was significantly associated with high vs. low psychological wellbeing.

Conclusions: Depression turned out to be significantly related to psychological wellbeing, contrary to pain and limitations in daily life. If further studies with larger, random samples can confirm these results, this knowledge may be important both in clinical settings and in future research.

Keywords: depression; health; limitations in daily life; musculoskeletal disorders; pain; wellbeing

Introduction

Musculoskeletal disorders are common and pose a significant problem among the working population. Three out of every five workers in the EU have reported musculoskeletal complaints in the back, upper limbs, and/or lower limbs [1]. In Sweden, musculoskeletal disorders constitute the second highest number of approved occupational diseases [2], causing individual suffering as well as societal costs. During 2020, 15–18 % of all sick leave was due to problems in the musculoskeletal system.

Such disorders not only result in musculoskeletal pain but also affect mobility, activities of daily life, and emotions. Recommended treatment is therefore multimodal in teams with different specialties. Evaluation has shown multimodal treatment for low-back problems to be more effective than conventional pain treatments, such as only physiotherapy or medication in reducing pain and activity limitations and increasing return to work [3]. Conversely, multimodal rehabilitation compared to conventional treatment has not proven cost-effective from a societal perspective. Costs increased due to lower employment rates, decreased

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income, and increased number of days on sick leave, as the treatment tended to entail initial sick leave which then became permanent [4]. However, a recent study report cost-effectiveness in terms of increased quality of life and decreased sickness absence at one-year follow-up [5].

In the evaluation of symptoms and rehabilitation, pain intensity, physical functioning, emotional functioning, and participant ratings of improvement and satisfaction with treatment have been recommended [6]. Evaluation of a patient's symptoms and the results of rehabilitation thus often focus on pain combined with other aspects. However, the choice of which components to evaluate differs between instruments [7–9] and the correspondence between the instruments and the symptoms the patients experience is often low [10].

For those affected by musculoskeletal disorders wellbeing and enjoyment of life have been appraised as the most important health aspects [11] and more influential related to care-seeking [12] than pain reduction. A theoretical model of psychological well-being encompassing 6 distinct dimensions (Autonomy, Environmental Mastery, Personal Growth, Positive Relations with Others, Purpose in Life, Self-Acceptance) has been presented by Ryff and Keyes [13]. Incorporating psychological wellbeing as a measure of a patient's health and investigating the relationship between psychological wellbeing and relevant symptoms of non-specific musculoskeletal disorders may show the relevance of different aspects of wellbeing in evaluating symptoms and rehabilitation. This insight may contribute valuable knowledge as finding a cure and alleviating symptoms of non-specific musculoskeletal disorders can be challenging. Consequently, our research question was:

- To what extent are measures of general, physical and mental health; functional limitations; pain intensity; mood and sleep associated with psychological wellbeing among working-aged men and women who participate in multimodal rehabilitation for non-specific musculoskeletal disorders?

Materials and methods

Study design and sample

A cross-sectional questionnaire study with a correlational design was used. Persons who had been referred for multimodal rehabilitation by their primary care physician were consecutively invited to participate in the study. Indications for referral were: (i) persistent or intermittent pain for at least three months, (ii) pain that adversely affects daily life to a high degree, (iii) the person having the potential for active change despite the pain, and (iv) no co-morbidity or other condition that would hinder participation in the rehabilitation program [14]. The intention

was to enroll at least 300 participants; difficulty engaging patients resulted in a prolonged period of data collection (2010–2015) to finally reach 116 participants. Participation in the study was voluntary, and participants could withdraw from the study at any time. Ethics approval was obtained from the regional ethical review board of Uppsala (Dnr 2010/116).

Data collection

Data collection was performed in central Sweden with the assistance of eight multimodal rehabilitation teams in primary care and the staff of two specialist care centres. The teams distributed and collected the questionnaires from participants in the rehabilitation program who has consented to participate in the study. The questionnaires were accompanied by an information letter explaining the aim of the study and assurances of confidentiality.

Dependent measure

Primary outcome psychological wellbeing: To measure psychological wellbeing, the Ryff Psychological Well-being Scale (RPWS) [15–17] was used. The 18-item version of the scale was used, which contains 18 items in six subscales (three items each): self-acceptance; positive relations with others; autonomy; environmental mastery; purpose in life; and personal growth [11]. Psychological wellbeing was calculated as the overall RPWS index. A median split converted the continuous variable to a categorical one. If a participant's index was >78 they were categorized as having high psychological wellbeing; otherwise, they were categorized as having low psychological wellbeing. In the present study, Cronbach's alpha value was 0.86.

Independent measures

Physical and mental health: The Short Form 36-item Health Survey (SF-36) [18] covers physical and mental health using eight health concepts: (i) physical functioning (PF) measuring limitations in physical activities because of health problems; (ii) social functioning (SF) measuring limitations in social activities because of physical or emotional problems; (iii) role-physical (RP) measuring limitations in usual role activities because of physical health problems; (iv) bodily pain (BP); (v) mental health (MH) measuring general mental health; (vi) role-emotional (RE) measuring limitations in usual role activities because of emotional problems; (vii) vitality (VT) measuring energy and fatigue; and (viii) general health (GH) measuring general health perceptions [14]. Physical and mental health can be scored using the eight individual indexes, two component scores, one for physical (PCS: PF, RP, BP, GH) and one for mental health (MCS: MH, RE, SF, VT), or an overall summation score, with a higher score indicating better health status. The current study used the two components PCS and MCS. The item "In general, would you say your health is excellent, very good, good, moderate, poor?" of the GH-index was additionally chosen as a measure of general health, hereinafter referred to as "Single-item GH". Cronbach's alpha values for the components were 0.76 and 0.82, respectively.

Pain intensity and limitations in daily life: The Multidimensional Pain Inventory – Swedish version (MPI-S) [19] was chosen for the assessment

of pain intensity because it includes a Numeric Rating Scale (NRS) to measure pain intensity in two different temporal time perspectives (currently and past 7 days). Items 1 and 7 from part 1 of the MPI-S questionnaire provided the score for pain intensity and the interference index from MPI-S part 2 the score for limitations in daily life. Higher scores represent more pain and greater limitations in daily life. Cronbach's alpha value for pain intensity was 0.85, and for limitation in daily life 0.93.

Depression and sleep: The Montgomery-Åsberg Depression Scale (MADRS-S) [20] was chosen to measure depression. The questionnaire rates the last three days' core symptoms of depression in 9 items (mood, anxiety, sleep, appetite, ability to concentrate, degree of initiative, emotional commitment, pessimism, and vitality). Reduction in score reflects improvement vis-à-vis depressive symptoms. One single item of the questionnaire was additionally chosen as a measure of sleep quality. Cronbach's alpha value for the overall index was 0.89.

Statistical analyses

All analyses were conducted in IBM SPSS statistics 22. Descriptive statistics of frequencies, proportions, mean and standard deviations describe the participant characteristics. Spearman's rho correlation coefficient (r) was used to study bivariate relationships between the outcome psychological wellbeing and the independent variables, as well as among the variables. The strength of the correlation was considered weak at 0 to 0.2, medium at 0.3 to 0.6, and strong from 0.7 to 1 [21]. The Mann-Whitney U test was used to compare differences in ratings of the included variables following the median split of the group into low vs. high psychological wellbeing, except for age (independent samples t-test) and sex (Chi-square test). Logistic regression analyses were used to define the extent to which the following factors were associated with low or high psychological wellbeing: Single-item GH, PCS, MCS, pain intensity, limitations in daily life, depression and sleep. Initially, the independent variables were analysed separately (unadjusted analyses). Then all independent variables were analysed together with and without adjustment for the two covariates age and sex (adjusted analyses), as data on 114 participants gave sufficient statistical power to allow the inclusion of the independent variables and two covariates in the models simultaneously [22]. Nagelkerke's pseudo R^2 was used to measure the goodness-of-fit of the logistic regression model. No outliers in the data were observed. The level of significance was set at $p < 0.05$. Missing data were replaced based on instructions for each instrument. Internal consistency of scales was estimated by Cronbach's alpha coefficient.

Results

Characteristics of the sample

The sample consisted of 116 participants, 29 (25 %) male and 87 (75 %) female, with non-specific musculoskeletal disorders in different parts of the body. The mean age was 46 years (min–max 20–69; SD 10.2). Participants reported a pain duration of at least 3 months with a mean duration of 132.7 months (min–max 6–576; SD 116.9; Md 120; IQR 138).

Regarding occupational status, 51 % were working at the time of data collection, 22 % were unemployed and 27 % were on sick leave. Among those working, 44 % worked full time, 16 % three-quarter time, 27 % half-time and 14 % one-quarter time. With respect to personal finances, 3 % reported very good economic status, 24 % good, 36 % neither good nor bad, 18 % strained, and 17 % very strained. Seventeen percent of the participants were living alone, while 7 % were living alone with one or more children, 36 % were living with another adult, and 40 % were living with another adult and one or more children. Forty-nine percent reported their responsibility for household chores, 9 % that someone else had that responsibility, and 42 % reported shared responsibility. There was a high degree of co-morbidity, with 20 of the participants reporting 4 other diseases diagnosed by a physician, 5 reporting 5, and 4 reporting 6. Most prevalent were mental problems (e.g. “nervous problems”, depression, anxiety, severe sleep disturbance) ($n=29$), some sort of disease of the stomach/digestive organs ($n=29$) and other illness or disability (undefined) ($n=20$). Only 13 (11 %) of the participants reported no diagnosed co-morbidity.

Table 1 shows that the group reporting low psychological wellbeing also reported lower mental health and worse depression than the group reporting high psychological wellbeing.

Bivariate correlations

Table 2 shows Spearman's correlations (r_s) between the independent variables and psychological wellbeing as the dependent variable, and between each of the independent variables. Psychological wellbeing showed a negative, statistically significant correlation with limitations of daily life (-0.254 ; $p=0.006$), depression (-0.661 ; $p<0.001$), and sleep (-0.230 ; $p=0.020$) and a positive, statistically significant correlation with MCS (0.383 ; $p<0.001$). Correlations between the independent variables were weak to moderate, and the range of significant correlations was $r_s=0.005$ to $r_s=-0.622$.

Logistic analysis – psychological wellbeing and the independent variables

Table 3 indicates decreased odds of psychological wellbeing for persons rated high on depression, with the results remaining significant after adjusting for sex and age. In addition, being a woman increased the odds of high psychological wellbeing. Nagelkerke's pseudo R^2 of the adjusted

Table 1: The groups' ratings for the included variables.

Variable	Total group Mean, SD Median (IQR)	Low psychological wellbeing (n=53–62) Mean, SD	High psychological wellbeing (n=48–52) Mean, SD	p-Values
Age	46 (10.2)	45.6 (10.1)	46.2 (10.4)	0.737
Sex	M=29 (25.4 %) F=85 (74.6 %)	M=17 (27.4 %) F=45 (72.6 %)	M=12 (23.1 %) F=40 (76.9 %)	0.669
Single-item GH	3.8 (0.9) 4.0 (1)	3.9 (0.9)	3.8 (0.9)	0.606
PCS	32.2 (8.1) 32.1 (10.9)	32.6 (7.7)	32.0 (8.5)	0.076
MCS	40.2 (13.4) 41.0 (23.6)	36.2 (13.0)	44.7 (12.7)	0.001
Pain intensity	3.7 (1.2) 4.0 (2)	3.7 (1.1)	3.7 (1.2)	0.716
Limitations in daily life	4.0 (1.3) 4.2 (2)	4.2 (1.1)	3.7 (1.4)	0.088
Depression	14.9 (9.4) 14.0 (15)	19.9 (8.7)	9.6 (6.8)	0.000
Sleep	2.7 (1.6) 3.0 (2)	3.0 (1.6)	2.5 (1.5)	0.071

All analyses were made using the Mann-Whitney U Test, except for age (independent samples t-test), and sex (Chi-square test, Fisher's Exact test). M, male; F, female; Single-item GH, single item of the general health index in SF-36; PCS, Physical health component score in SF-36; MCS, Mental health component score in SF-36. Higher scores on Single-item GH, PCS, and MCS indicate better health status; higher scores on Pain intensity, Limitations of daily life, Depression, and Sleep indicate worse health status. Bold indicates significant values.

Table 2: Spearman's Rank correlations (r_s) between the independent variables and the dependent variable psychological wellbeing (n=102–115).

	Well-being	Single-item GH	PCS	MCS	Pain intensity	Limit. of daily life	Depression	Sleep
Psychological wellbeing	1.00							
Single-item GH	−0.077	1.00						
PCS	0.068	−0.423 ^b	1.00					
MCS	0.383 ^b	−0.414 ^b	0.005	1.00				
Pain intensity	−0.060	0.394 ^b	−0.622 ^b	−0.243 ^b	1.00			
Limit. in daily life	−0.254 ^b	0.441 ^b	−0.437 ^b	−0.585 ^b	0.439 ^b	1.00		
Depression	−0.661 ^b	0.401 ^b	−0.282 ^b	−0.474 ^b	0.331 ^b	0.478 ^b	1.00	
Sleep	−0.230 ^a	0.314 ^b	−0.259 ^b	−0.213 ^a	0.321 ^b	0.357 ^b	0.556 ^b	1.00

^ap<0.05, ^bp<0.01. Single-item GH, single item of the general health index in SF-36; PCS, physical health component score in SF-36; MCS, mental health component score in SF-36. Higher scores on Single-item GH, PCS, and MCS indicate better health status; higher scores on Pain intensity, Limitations of daily life, Depression, and Sleep indicate worse health status.

model was 0.543. The variance inflation factor was less than 2.8, indicating no multi-collinearity between the independent variables in the models.

Discussion

Our research question was to what extent is psychological wellbeing associated with general health, physical and mental health, pain intensity, limitations in daily life, depression and sleep? The results showed decreased odds of psychological wellbeing for persons who rated high on

depression, results that remained significant after adjusting for sex and age. Being a woman increased the odds of high psychological wellbeing. None of the other independent variables studied was significantly associated with high vs. low psychological wellbeing.

Our choice of instruments to use in the analyses, both in the present and in previous studies [23, 24], relied on the bio-psycho-social model [25, 26], which most often is used in analyses of patient problems and decisions on treatment approach [27]. Another basis for our decision came from the IMMPACT group, which recommends measurement of pain, physical and emotional functioning, and the patient's rating

Table 3: Logistic regression analysis of independent variables and psychological wellbeing as dependent variable (n=99).

Independent variables	Unadjusted analysis			Adjusted analysis		
	OR	CI 95 %	p-Value	OR	95 % CI	p-Value
Single-item GH	1.70	0.85–3.39	0.132	1.88	0.90–3.95	0.094
PCS	1.00	0.90–1.11	0.993	1.03	0.92–1.15	0.666
MCS	1.02	0.96–1.09	0.463	1.02	0.95–1.09	0.557
Pain intensity	1.54	0.83–2.85	0.167	1.93	0.95–3.94	0.069
Limit daily life	0.93	0.49–1.77	0.829	0.80	0.40–1.63	0.543
Depression	0.79	0.71–0.88	0.001	0.76	0.66–0.87	0.001
Sleep	1.32	0.87–1.99	0.188	1.49	0.94–2.35	0.090
Age				1.03	0.97–1.09	0.334
Sex				5.65	1.13–28.37	0.035

OR, odds ratio; CI, confidence interval. Bold indicates significant values.

of global improvement and satisfaction with treatment [6, 19]. A further important theoretical model that was considered is the ICF model for the classification of functioning, disability and health [28]. Thus, we included measures for pain, physical functioning, psychological functioning and general health.

As a point of comparison, a variety of different measures were found in the studies included in a recent review of treatment studies [27]. The SF-36 (or the 12-item version) was most often used to measure health-related quality of life, both as a total score and for the subscales. The ICF domain of Body Function was most often measured in terms of pain intensity and depression, and occasionally sleep. The ICF domain Activity and participation was most often measured in terms of pain-related physical and social-functional limitations. The questionnaires for these two ICF domains were not specified in the report.

Consensus on what to measure in evaluating treatment would make comparisons easier. There are, however, a multitude of instruments in use. Prior reviews on the content and quality of questionnaires used to evaluate musculoskeletal symptoms [7–9] suggest that questionnaires aimed at evaluating the same condition are often not comparable due to differing items. Questionnaires often cover only some of the symptoms patients experience and different aspects of those experiences [10]. A consensus on measures would increase the possibility of drawing reliable conclusions from the results of different interventions in rehabilitation. Such consensus is needed for both content and quality of the chosen instruments.

Depression scales are most often used to measure emotional functioning. We used a measure of positive emotional functioning and assessed if there was any specific relation between wellness and symptoms often present in musculoskeletal disorders. The reason for this choice is that

emotional wellbeing and enjoyment of life have been appraised as the most important health aspects, in addition to pain reduction, for those affected by musculoskeletal disorders [11]. When it comes to care-seeking, wellbeing has also proven to be more influential than specific somatic symptoms [12].

In a previous study of women with musculoskeletal disorders [23] we attempted to construct a short-form questionnaire. The results indicated the relevance of including wellbeing as a measure of health. Even though successfully used in this prior research, the questionnaire may not be the most suitable for measuring wellbeing, leaving open the question of a possible better choice. Other commonly used questionnaires seem to measure general health or quality of life rather than wellbeing as such. The results in our follow-up study to test the questionnaire in a mixed-sex sample [24] did not indicate the same fit as for the women-only sample, raising the question of the difference being gender related.

The composition and characteristics of a sample in a study must be considered. A recent review reported multimodal and interdisciplinary treatments to be comparable to other interventions, additionally indicating that they may be more effective for people with long-term pain [25]. However, these results showed moderate reliability and there was uncertainty regarding sample comparability with those intended for multimodal rehabilitation for long-term pain in Swedish health care. One criterion for inclusion in multimodal rehabilitation in Sweden is that the participant does not have any co-morbidity or other condition that could hinder participation in the rehabilitation program. Despite this criterion, the degree of co-morbidity in the sample was surprisingly high. Twenty participants reported 4 other physician-diagnosed diseases, and only 13 of the participants reported no diagnosed co-morbidity at all. Co-morbidity to this extent may affect the results of rehabilitation as well as the participants' wellbeing. Previous studies have shown that people with long-term pain more often have other medical conditions such as cardiovascular disease [29], as was also shown in the present study. This information is important because studies [30, 31] have found that the risk of a person with severe long-term pain dying from some other disease is higher than for a person without, or with mild, long-term pain. Nevertheless, in the present study, neither pain nor limitations in daily life turned out to be significant aspects related to psychological wellbeing, while depression did.

Early treatment is important to avoid severe long-term pain; however, finding and including participants at an early stage of the disorder has proven to be difficult, probably because people tend to delay seeking care until the disorder

severely affects their ability to work, interfering with their ordinary daily life.

A strength of the present study is that we took previous recommendations under consideration in our choice of outcome measures. Furthermore, a health-promoting perspective is included by adding a measure of psychological wellbeing in an effort to grasp the entire picture.

However, the sample in the present study was small, even though we made efforts to increase participation by engaging the rehabilitation teams in data collection, extending the sampling period, and including additional rehabilitation groups. In the present study we asked all the rehabilitation teams in the county if they wanted to participate, but for various reasons the participation was less than expected. This was mainly due to the fact that some teams did not have a continuous staffing cover, which meant that their activities were limited. Another reason was that relatively few patients in the rehabilitation groups chose to participate. The patients were already asked by their rehabilitation teams to fill out questionnaires to assess the results of the rehabilitation. When they were also asked if they wanted to answer the questionnaire in this study, it may have been perceived as too demanding. Due to the low number of participants only a limited number of variables could be included in the logistic regression analyses, which in turn limited statistical power. A higher number of participants, and thereby a higher statistical power, could have yielded more reliable results. Furthermore, we cannot generalize the results since the participants were not randomly selected. However, the sample was representative of the national population engaged in multimodal rehabilitation regarding age and gender [32].

Conclusions

The present study aimed to investigate which, if any, of the included variables were associated with psychological wellbeing, possibly pointing to alternative directions in rehabilitation. Depression turned out to be significantly related to psychological wellbeing, contrary to pain and limitations in daily life. If further studies with larger, random samples can confirm these results, this knowledge may be important both in clinical settings and in future research.

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