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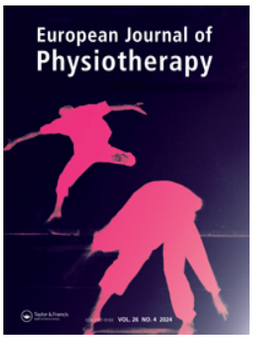

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RESEARCH ARTICLE

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Gender-stratified analysis of psychosocial factors and physical function in higher education students with musculoskeletal pain

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ABSTRACT

Purpose: To evaluate the prevalence of psychosocial factors in higher education students with musculoskeletal pain and whether these factors are associated with physical function.

Materials and methods: Participants were higher education students with musculoskeletal pain. The data were collected using questionnaires: the Patient-Specific Functional Scale, the Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ-SF) and the Mental Health Index (MHI-5). The associations were analysed using a generalised linear model, adjusted for the region of Finnish Student Health Service in Finland, age, level of education and field of study.

Results: A total of 242 women and 104 men (N=346, mean age 28±8years) participated in the study. The prevalence of psychosocial factors varied from 16% to 25% among women and 14% to 18% among men, depending on the measurement tool used. Psychosocial factors were associated with lower physical function in women (p=.011) and men (p<.001) when measured with ÖMPSQ-SF, but not with MHI-5.

Conclusions: Psychosocial factors are prevalent among higher education students experiencing musculoskeletal pain. Furthermore, psychosocial factors exhibit an association with lower physical function when assessed using the ÖMPSQ-SF but not when using the MHI-5. These findings emphasise the importance of addressing psychosocial factors through screening in direct access physiotherapy.

Abbreviations: MSK: musculoskeletal; ÖMPSQ-SF: the Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire; PSFS: the Patient-Specific Functional Scale; MHI-5: the Mental Health Index;

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Student health care; mental health; musculoskeletal disorders; psychological distress; primary care physiotherapy; first point of contact physiotherapy

Introduction

Mental health issues among higher education students are a growing concern around the globe [1]. Over 30% of students suffer from clinically significant psychological distress, which is a higher prevalence than in the general population [2,3]. Musculoskeletal (MSK) pain is also a common symptom among higher education students, with prevalence varying from 33% to 65% [4–8]. Moreover, MSK pain and psychological distress often coexist [9,10]. Psychological distress, such as stress, depression and anxiety, has been identified as one of the risk factors across studies for MSK pain among higher education students [11–16]. In broader terms, psychological distress is classified as one of the psychosocial risk factors, alongside others such as pain catastrophizing, fear-avoidance behaviour, and low self-efficacy, all of which are also associated with MSK pain [9,17,18]. Pain-related psychosocial factors play a significant role in the transition from acute to chronic disabling pain [19–21].

However, the association between psychosocial factors and physical function is unknown among higher education students with MSK pain. Even though previous research has shown the relevance of psychosocial factors to pain prognosis [9,18], there is a lack of knowledge about whether these factors also have a role in physical functioning among higher education students with MSK pain. Psychosocial factors and pain are closely associated with physical function. Higher levels of pain, depression, anxiety, pain catastrophizing, fear-avoidance behaviour, and negative thoughts and beliefs can all increase the risk of disability [20–22]. Moreover, young adults are important for the future work force. Studies show that work absenteeism is associated with psychosocial factors in young adults with MSK pain [23]. In this study, we investigated whether physical function is already compromised before entering the workforce among students who suffer from MSK pain and have a more unfavourable psychosocial profile.

The importance of screening for unfavourable psychosocial factors in the treatment of MSK pain is evident [24]. By identifying these factors, physiotherapists can make informed decisions throughout an episode of care [25]. Psychologically informed physiotherapy and the integration of psychological interventions with physiotherapy are recommended approaches

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when treating MSK pain patients with a high risk of pain persistence [25,26]. Direct access physiotherapy is a health care protocol where patients with MSK pain visit a physiotherapist without a referral by a physician and one of its objectives is to identify psychosocial risk factors for chronic pain [27]. Previous studies have demonstrated that direct access physiotherapy is an efficient and safe method for treating students with MSK pain [28,29] and it is widely utilised in public healthcare settings in Finland [27].

Firstly, we aimed to investigate the prevalence of psychosocial factors among higher education students with MSK pain attending direct access physiotherapy. Secondly, we examined whether the psychosocial factors are associated with physical function. We conducted gender-stratified analyses, given that psychosocial factors are more prevalent among women than men [30,31]. We hypothesised that the presence of psychosocial factors is associated with lower physical function in both men and women.

Methods

This study is a cross-sectional study of higher education students (university and polytechnic) with MSK pain who visited direct access physiotherapy in Finnish Student Health Service (FSHS) between 28 November 2022 and 31 May 2023. The data were collected from three different questionnaires, which were digitally sent to the students before their direct access physiotherapy visit. A total of 1510 students were invited to participate in the study *via* the Self online service. Participants were sent a reminder *via* text message approximately a week later. The inclusion criteria for the study were as follows: (a) a visit to direct access physiotherapy, (b) digital consent for participation in the study, and (c) completion of at least any two out of the three questionnaires before the visit. Conversely, the exclusion criteria were: (a) physiotherapy visit with a physician's referral, (b) refusal to provide digital consent for the study, and (c) failure to complete at least two out of the three questionnaires. Out of the 1510 invited participants, 1144 were excluded for not providing digital consent for participation in the study, and 20 were excluded for not having completed at least two out of the three questionnaires. The final study sample comprised 346 voluntary participants. All participants were informed of the nature of the study and provided digital consent to participate using strong identification. The study was approved by the University of Jyväskylä Ethical Committee on 10 August 2021 (157/13.00.04.00/2021).

Physical function assessment

Physical function was assessed with the Patient-Specific Functional Scale (PSFS). PSFS is a self-report outcome measure of function which allows patients to assess their own impaired activities. It comprehensively captures limitations in functioning that each patient finds the most important, including in patients with low activity limitation [32]. In this study, we used the PSFS where participants could identify one to three important activities, they were unable to perform or were having difficulties with due to their MSK pain. The scores ranged from 0 (unable to perform activity) to 10 (able to perform activity at the same level as before injury or problem) for each activity. The total mean score was calculated by summing the activity scores then dividing by the number of activities. This total score was used as a continuous variable in the analyses. Lehtola et al. [33] have translated the PSFS questionnaire into Finnish and have shown that it performs as well as the original. It has adequate content validity and responsiveness, making it a recommended assessment tool for clinical and research use [33]. Importantly, it has been demonstrated to be a valid, reliable, and responsive outcome measure in clinical use for patients with MSK disorders [34].

Psychosocial risk factors assessment

Psychosocial factors were assessed using two different questionnaires. The first one is a multidimensional screening tool: the Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ-SF). This tool was chosen for its multipurpose abilities to identify several psychological prognostic risk factors, including depressive and anxiety symptoms, catastrophizing, as well as fear-avoidance beliefs [35,36]. ÖMPSQ-SF is also known to predict work absenteeism in young adult workers [23]. The second tool is specifically designed to measure psychological distress, and the assessment is conducted using the Mental Health Index (MHI-5) [37]. This tool was chosen for its usefulness to screen specifically for mood and anxiety disorders which are known to be common among higher education students [38].

ÖMPSQ-SF is a shortened version of the 25-item Örebro musculoskeletal pain screening questionnaire (ÖMPSQ), with scores ranging from 1 to 100. The ÖMPSQ was translated into Finnish by Ruokolainen et al. [35]. In that study, the Finnish version of the ÖMPSQ was found to have good reliability and construct validity. The ÖMPSQ-SF questionnaire includes 10 items: (1) How long have you had your current pain problem? (2) How would you rate the pain that you have had during the past week? (3) I can do light work for an hour (4) I can sleep at night (5) How tense or anxious have you felt in the past week? (6) How much have you been bothered by feeling depressed in the past week? (7) In your view, how large is the risk that your current pain may become persistent? (8) In your estimation, what are the chances you will be working your normal duties in three months? (9) An increase in pain is an indication that I should stop what I'm doing until the pain decreases (10). I should not do my normal daily duties (including work) with my present pain. Item 1 is scored on a scale from 1 to 10, and items 2–10 are scored from 0 to 10, with 0 indicating the absence of impairment and 10 indicating severe impairment. The ÖMPSQ-SF score was categorised into low- (<40 points), moderate- (40–50 points) and high-risk (>50 points) groups [36,39]. The low-risk group was used as a reference category in analyses.

Psychological distress was evaluated with the MHI-5, with scores ranging from 0 to 100, where 0 indicates the worst health possible and 100 indicates the best health achievable. The five items of the MHI-5 were as follows: In the previous

four weeks: (1) Have you been a very nervous person? (2) Have you felt so down in the dumps that nothing could cheer you up? (3) Have you felt calm and peaceful? (4) Have you felt downhearted and low? (5) Have you been a happy person? In this study, we applied the cut-off of 52 points, as recommended by Parikka et al. [40], treating the MHI-5 as a dichotomous variable. A score of 52 or less was considered to be indicative of clinically significant psychological distress ('yes'). A score over 52 points was seen as indicative of no clinically significant psychological distress ('no'). The latter category was used as the reference category in analyses. The psychometric properties of the MHI-5 in the Finnish population have been demonstrated to be acceptable, and this measurement tool has been shown to be useful in epidemiological studies, such as when examining associations between mental health and various outcomes [37]. The MHI-5 has also been used previously to measure psychological distress in patients with musculoskeletal pain [41,42].

Covariates

There are well-acknowledged health differences between different areas in Finland. Inhabitants of southern and western Finland are known to be healthier in general than the population in the east and north of the country [43]. Moreover, socioeconomic status influences health, and blue-collar workers have more MSK and mental health problems than white-collar workers [44]. Even though both university and polytechnic schools are classified as higher education, polytechnic schools in Finland tend to have more blue-collar subjects from fields such as nursing or service. There is a previous indication that polytechnic students perceive their health to be worse than university students perceive their own to be [40]. Therefore, in this study, we consider the level of studies (university/polytechnic), field of studies (health and service; business and society; natural and medical; technical; arts and humanities; and undefined), area in Finland (south, east, west, central, and north), as well as age to be covariates. The health and medical categories have been divided into separate groups because the health category includes polytechnic subjects such as nursing, while the medical category includes university-based subjects such as medical students. Information on covariates was gathered from patient data.

Statistical analysis

Normality tests were performed with the Kolmogorov-Smirnov test for continuous variables and descriptive statistics were used to summarise patient characteristics. Categorical data are presented as numbers and percentages, and continuous data as means and standard deviations, if normally distributed, and as medians and interquartile ranges, if not normally distributed. The statistical significance of the estimated differences between genders in terms of the included variables was assessed using the Chi-square test for categorical variables, *t* tests for the normally distributed continuous variable (physical function), and the Mann–Whitney test for the not normally distributed continuous variable (age). The Kruskal–Wallis test was used in the analysis to estimate median differences in the item scores of the ÖMPSQ-SF between the ÖMPSQ-SF risk groups. The gender-stratified associations between psychosocial risk factors and physical function were analysed using a generalised linear model (GLM), presented as beta (ß) coefficients and their 95% confidence intervals (CI). The dependent variable was physical function, and the independent variables were ÖMPSQ-SF risk groups and MHI-5 categories. As such, we constructed two different models: (a) the association of the ÖMPSQ-SF risk groups with physical function, and (b) the association of the MHI-5 categories with physical function. Both models were presented as unadjusted and adjusted for all covariates. The potential interaction between ÖMPSQ-SF risk groups and gender was analysed using an interaction term and it was found to be non-significant. All analyses were performed with IBM SPSS Statistics (version 29.0.1.0). We considered a *p* value of <.05 as the threshold for statistical significance.

Results

A total of 346 volunteer students with MSK pain (women $n=242$ and men $n=104$, mean age 28 ± 8 years) participated in the study. The gender-stratified demographics of the participants are presented in Table 1. The prevalence of clinically significant psychological distress was higher in women (25%) than in men (14%) (effect size 0.13, $p=.019$). A total of 16% of women and 18% of men belonged to the high-risk group of the ÖMPSQ-SF (effect size 0.1, $p=.180$). There were no statistically significant differences in physical function between the genders. Women were more likely than men to pursue studies in the health and service field, as well as arts and humanities. Conversely, men were more likely than women to focus on technical fields (effect size 0.39, $p<.001$).

Compared to the low-risk group of the ÖMPSQ-SF, the high-risk group was associated with lower physical function before and after adjustments in both men (adjusted coefficient (ß) −1.84, 95% confidence interval (CI) −2.84–(−0.84)) and women (adjusted ß −0.89, 95%CI −1.58 – (−0.21); Table 2). The association was somewhat stronger among men than it was among women. Meanwhile, the moderate-risk group showed an association with lower physical function only in men (adjusted ß −1.43, 95%CI −2.62 – (−0.23)). As for the psychological distress, defined using the MHI-5, we detected no statistically significant associations between clinically significant psychological distress and physical function in either women or men (Table 3).

Discussion

This study investigated the prevalence of psychosocial factors among higher education students with MSK pain who were attending direct access physiotherapy, and the association of psychosocial factors – measured using two different questionnaires (ÖMPSQ-SF and MHI-5) – with physical function in that population. A total of 16% of the participants belonged to the high-risk groups in ÖMPSQ-SF and there was no statistically significant difference between the genders. Every

fifth woman and every seventh man with MSK pain reported clinically significant psychological distress according to MHI-5. The high-risk group of the ÖMPSQ-SF associated with lower physical function in both men and women, while moderate-risk group had a statistically significant association with lower physical function only in men. No associations were found between psychological distress – measured with the MHI-5 – and physical function.

Table 1. Participant demographics by gender in direct access physiotherapy for musculoskeletal pain.

	Total ($n=346$)	Women ($n=242$)	Men ($n=104$)	p Value for the difference between genders
FSHS area in Finland,	% (n)			.064
South	46 (160)	43 (103)	55 (57)	
East	22 (77)	26 (64)	13 (13)	
West	10 (33)	9 (22)	10 (11)	
Middle	10 (36)	10 (25)	11 (11)	
North	12 (40)	12 (28)	11 (12)	
Level of studies, % (n)				.833
Polytechnic	39 (136)	40 (96)	39 (40)	
University	61 (210)	60 (146)	61 (64)	
Field of study, % (n)				**<.001**
Health and service	22 (76)	27 (66)	10 (10)	
Business and society	19 (65)	19 (46)	18 (19)	
Natural and medical	11 (38)	12 (28)	10 (10)	
Technical	24 (84)	14 (34)	48 (50)	
Arts and humanities	21 (72)	25 (60)	11 (12)	
Undefined	3 (11)	3 (8)	$n<5$	
Age				.146
median (IQR)	27.9 (23–29)	27.7 (23–29)	28.3 (23.5–30)	
Psychological distress[a], % (n)	$n=339$	$n=236$	$n=103$	**.019**
No	79 (266)	75 (177)	86 (89)	
Yes	22 (73)	25 (59)	14 (14)	
ÖMSQ-SF risk groups % (n)	$n=342$	$n=238$	$n=104$	.180
High-risk	16 (56)	16 (37)	18 (19)	
Moderate-risk	16 (55)	19 (44)	11 (11)	
Low-risk	68 (231)	66 (157)	71 (74)	
Physical function[b]	$n=335$	$n=233$	$n=102$	.668
Mean (SD)	5.31 (1.97)	5.34 (1.95)	5.24 (2.02	
Pain[c]	$n=342$	$n=238$	$n=104$	.184
mean (SD)	4.41 (2.14)	4.51 (2.12)	4.17 (2.18)	

Note: FSHS: Finnish Student Health Service; ÖMPSQ-SF: Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire; IQR: interquartile range; *SD*: standard deviation. Statistically significant results p value < .05 have been bolded.
[a]Psychological distress measured by Mental Health Index (MHI-5) with cut-off point at 52 where 'no' > 52 points.
[b]Measured with the Patient-Specific Functional Scale (PSFS), scale from 0 (unable to perform activity) to 10 (able to perform activity at the same level as before the injury or problem).
[c]Measured with the ÖMPSQ-SF question "How would you rate the pain that you have had during the past week?' Scale from 0 (no pain) to 10 (worst possible pain).

In our study, the prevalence of psychological distress was not as high as that reported in a large-scale study by Parikka [40] conducted in 2021 among Finnish higher education students. In that study, every third student experienced psychological distress [40]. Whereas Parikka's [40] study examined the entire population of higher education students, our study specifically focused on students seeking health care for MSK pain. As students with MSK pain have been known to show a higher prevalence of psychological distress [15], it is surprising that they would have less psychological distress than the student population overall. One possible explanation for this discrepancy could be the impact of COVID-19 during the period of Parikka's [40] study. The pandemic is known to have increased mental health problems, especially among young adults, starting from April 2020 onwards [45]. Our study took place at the end of 2022 and early 2023 when society had returned to a state similar to the time before COVID-19. This difference in study periods may account for the variations in the prevalence of psychological distress between Parikka's study [40] and ours. Despite the notable increase in mental health issues among young people during COVID-19, they are also recognised for their relatively faster recovery compared to other populations [46].

When psychosocial factors were measured with the multidimensional ÖMPSQ-SF, we found a significant association with physical function. It appeared that this association was somewhat stronger among men than it was among women. Surprisingly, psychological distress alone was not associated with the outcome when measured with MHI-5. Therefore, we agree with the study by Leech et al. [9] that some aspects of psychosocial factors may be more relevant to physical function than are others. This underscores the importance of choosing the most suitable screening tools for screening psychosocial factors in a clinical setting. Currently, there is no screening tool that can be considered a gold standard, and the most suitable tool varies based on the patient

Table 2. Gender-stratified analysis of the association of ÖMPSQ-SF risk groups with physical function.[a]

	Women					Men				
			95% Wald confidence interval					95% Wald confidence interval		
	ß	SE	Lower	Upper	p Value	ß	SE	Lower	Upper	p Value
ÖMPSQ-SF risk group unadjusted										
High-risk	**−0.97**	0.35	−1.65	−0.28	.006	**−1.87**	0.48	−2.80	−0.94	<.001
Moderate-risk	−0.53	0.33	−1.18	0.12	.107	**−1.52**	0.62	−2.74	−0.30	.015
Low-risk	Ref.									
Adjusted[b]										
High-risk	**−0.89**	0.35	−1.58	−0.21	.011	**−1.84**	0.51	−2.84	−0.84	<.001
Moderate-risk	−0.49	0.33	−1.13	0.16	.138	**−1.43**	0.61	−2.62	−0.23	.019
Low-risk	Ref.									

Note: ÖMPSQ-SF: Short Form of the Örebro Musculoskeletal Pain Screening Questionnaire; ß: Coefficient; SE: Standard Error. Statistically significant results p value < .05 have been bolded.
[a]ÖMPSQ-SF risk groups as independent variable and physical function as dependent variable.
[b]Adjusted for the area of Finnish Student Health Service in Finland, age, level of studies (university/polytechnic) and field of studies.

Table 3. Gender-stratified analysis of the association of psychological distress with physical function.[a]

	Women					Men				
			95% Wald confidence interval					95% Wald confidence interval		
	ß	SE	Lower	Upper	*p* Value	ß	SE	Lower	Upper	*p* Value
Psychological distress[b]										
Unadjusted										
Yes	−0.18	0.30	−0.77	0.40	.538	−0.62	0.57	−1.75	0.50	.279
No	Ref.									
Adjusted[c]										
Yes	−0.24	0.30	−0.83	0.35	.424	0.04	0.58	−1.09	1.17	.943
No	Ref.									

Note: ß: coefficient; SE: standard error.
[a]Psychological distress as independent variable and physical function as dependent variable.
[b]Psychological distress measured by the MHI-5 with the cut-off point at 52 where 'no' > 52.
[c]Adjusted for area of Finnish Student Health Care in Finland, age, level of studies (university/polytechnic) and field of studies.

population, the structure and culture of the healthcare organisation, documentation practices, and the practice setting of clinicians [25].

Our results indicate that the ÖMPSQ-SF outperforms the MHI-5 in the screening of higher education students in the context of direct access physiotherapy and physical function. It seems to do so especially among men. This may be related to the multidimensional nature of the questionnaire, which evaluates various dimensions of psychosocial factors. In a clinical setting, it is important to delve into the details of the answers to pinpoint the most problematic areas of the potential risk factors and focus more effort on those areas. It is likely that the concerns of young adults, who are at the beginning of their lives, differ from those of the older population. This is in line with Westman et al. [47], who stated that different dimensions of psychosocial wellbeing may have a distinct role in different study populations and at different time points.

The screening of psychosocial factors is recommended for patients with MSK pain in the clinical practice guidelines by the Finnish Medical Society Duodecim [48]. Our study supports this recommendation in student health care, as one-third of the students with MSK pain in direct access physiotherapy belonged to the moderate- or high-risk group in ÖMPSQ-SF. Of particular concern are the students who belong to the high-risk group. A study by Heikkala et al. [49] found that the ÖMPSQ-SF high-risk group had a 7.5-fold higher number of sick leave days and a 16-fold higher odds of disability pension than did the low-risk group during a two-year follow-up in a large Finnish population-based study. A study involving a cohort of young, community-based adult workers in Australia disclosed a prevalence of ÖMPSQ high-risk allocation (16%) comparable to our study among young adults experiencing MSK pain [23]. Additionally, the ÖMPSQ scores in that population were observed to be associated with absenteeism from work in the subsequent 12 months [23]. It remains unknown whether this association pertains to higher education students who are only just entering the workforce, and further research in this area is needed.

There are studies that support the findings of the association between psychological factors and physical function in adult populations [2,4]. To our knowledge, our study is the first to indicate this association within higher education students. Pain catastrophizing was associated with lowered physical function in a study by Birch et al. [2] involving patients with knee osteoarthritis, while Leech et al. [4] associated fear avoidance and negative mood with lowered physical function in patients with low back pain. High levels of emotional distress at baseline, as well as cognitive and behavioural risk factors, were associated with poor physical function in patients with MSK pain during a six-month follow-up [22]. Further research is needed to determine whether baseline psychosocial factors are associated with long-term physical function in higher education students with MSK pain.

Strengths and limitations

The strength of this study lies in its initiation of a conversation about the importance of the screening of psychosocial factors in both direct access physiotherapy and student health care. To the best of the authors' knowledge, this is among the first studies to evaluate psychosocial factors and their association with physical functioning among higher education students attending direct access physiotherapy due to their MSK pain. We successfully reached students from all areas of FSHS, covering the entirety of Finland and various fields of study, which improves the generalisability of the results. However, there are several limitations to acknowledge. Due to a high percentage of those invited not giving their written consent to participate in this study, selection bias cannot be ruled out. These results are also at best indicative by nature. Additionally, it should be acknowledged that even though the Patient-Specific Functional Scale is valuable for clinical use, it has not yet secured a standardised place in baseline research settings. This limitation could impact the results related to physical function. For future studies, it might be beneficial to consider more generic surveys, such as the Musculoskeletal Health Questionnaire [50]. In addition, the used measurements were based on self-reports that entail potential recall and social desirability bias. Finally, due to the cross-sectional study design, no conclusions about the cause-and-effect relationships could be made.

Conclusions

Psychosocial factors are prevalent among Finnish higher education students experiencing musculoskeletal pain and seeking direct access physiotherapy. Psychosocial factors exhibit

an association with lower physical function when assessed using ÖMPSQ-SF. This association was not observed when utilising MHI-5 for measurement. These findings emphasise the importance of specifically addressing psychosocial factors through screening. They also highlight the importance of carefully selecting the appropriate screening tool in the context of direct access physiotherapy within student healthcare.

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