



Socio-cultural associates of pain, disability and health-related quality of life in 1350 primary care physiotherapy patients with non-specific musculoskeletal pain[☆]

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Abstract

Objectives To 1) describe the socio-cultural characteristics of people with non-specific musculoskeletal pain (NSMSP) visiting Dutch primary care physiotherapy, and 2) to determine associations between socio-cultural factors and pain intensity, disability, and health-related quality of life (HRQoL) in people with NSMSP visiting Dutch primary care physiotherapy.

Design Exploratory cross-sectional study.

Setting 35 Dutch primary care physiotherapy facilities.

Participants 1350 patients with NSMSP.

Main outcome measures Participants completed self-reported questionnaires on socio-cultural (e.g., migration background, living situation, education level), demographic (e.g., sex, age), health-related (e.g., smoking, Body Mass Index (BMI)), and pain-related (e.g., analgesics) factors, along with standardized measures for outcomes pain intensity, disability, and HRQoL.

Results After controlling for covariates (sex, age, smoking, BMI, The Mental Health Inventory (MHI-5), co-morbidity, analgesics, and chronic widespread pain), socio-cultural variable migration background was associated with on average higher pain intensity ($\beta = .447, p < .001$), higher disability ($\beta = 3.997, p < .001$), and poorer mental HRQoL ($\beta = -1.475, p < .001$). Unemployment was associated with higher pain intensity ($\beta = .279, p .028$) and lower physical HRQoL ($\beta = -1.709, p .004$). Overall, higher education levels were associated with better outcomes, with on average lower pain intensity found for university ($\beta = -.731, p < .001$) and higher professional education levels ($\beta = -.358, p .003$) compared to no education.

[☆] The data that support the findings of this study are available on request from the corresponding author, [R. Annevelink]. The data are not publicly available due to restrictions e.g. their containing information that could compromise the privacy of research participants.

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Conclusions Migration background, unemployment and lower education levels were on average associated with poorer pain intensity, disability and HRQoL in people with NSMSP visiting Dutch primary care physiotherapy. Due to the cross-sectional nature of this study, findings should be interpreted with caution.

Contribution of the Paper

- This exploratory study found that migration background was associated with on average higher pain intensity ($\beta = .447, p < .001$), greater disability ($\beta = 3.997, p < .001$), and poorer mental health-related quality of life ($\beta = -1.475, p < .001$) in people with non-specific musculoskeletal pain visiting Dutch primary care physiotherapy.
- Unemployment was associated with higher pain intensity ($\beta = .279, p .028$) and lower physical health-related quality of life ($\beta = -1.709, p .004$), while higher education levels were associated with overall better non-specific musculoskeletal pain outcomes.
- These findings may enhance physiotherapists' understanding of the impact of socio-cultural factors on pain, disability, and health-related quality of life in non-specific musculoskeletal pain patients, highlighting existing health disparities within this group.

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Keywords: Musculoskeletal pain; Culture; Social factors; Physiotherapy

Introduction

Treating people with non-specific musculoskeletal pain (NSMSP) – musculoskeletal pain without a specific mechanical, neurological or pathological cause – effectively is one of the biggest challenges in health-care today. Europe has the leading position in healthy life years lost due to disability caused by NSMSP [1]. NSMSP is the main reason for people in the Netherlands to visit a primary care physiotherapist [2]. The intricate nature of NSMP necessitates unraveling its determinants [3], allowing physiotherapists to deliver optimal care.

Research indicates that NSMSP prevalence is unequally distributed among society at least partly due to socio-cultural differences [4]. Khalatbari-Soltani and Blyth [5] described that socio-economic position (SEP) (income, educational and occupational attainment) was associated with higher pain prevalence and worse outcomes. Lower socio-economic status (SES) (income, employment and education) was linked to increased risk for chronicity [6]. Dutch data reveals SES health disparities linking lower education and unemployment to reduced perceived health [7]. Additionally, social determinants like disadvantage and isolation were associated with greater pain interference and lower health-related quality of life (HRQoL) [8], while language proficiency was linked to health inequities through impaired healthcare communication [9]. Furthermore, several studies, primarily from the US, showed that pain perception and behavior are influenced by ethnicity and cultural background [10,11]. Ethnic minorities report higher pain intensity and pain-related impairments [12–14]. Some studies, though inconclusive, have linked religion and spirituality to pain and psychological function in people with chronic NSMSP [4,15]. These findings imply that socio-cultural background together with life-course

environmental exposures may lead to poorer NSMSP outcomes for some individuals.

NSMSP involves complex interactions among various bio-psycho-social-cultural factors [3]. However, previous research has merely focused on singular socio-demographic factors and broad ethnicity and race comparisons [14]. From an ethnocultural perspective, wherein culture is linked to ethnicity and social constructs [16], both cultural and social factors such as migration background and living situation should be explored. Socio-cultural factors play a global role in health inequalities, both in high-income and in middle- and low-income countries [17]. With most research in this field conducted in the US, compatibility with European populations is limited by societal and socio-demographic differences [18]. The few studies that analyzed European populations indicate that lower education levels and work position, financial hardship and migration background were associated with higher (chronic) pain prevalence [19–21], and differences in pain perception and coping related to culture [22]. Since most European research relied on general data from national health surveys [19,20], less is known about the role of multiple socio-cultural factors in people with NSMSP visiting primary care physiotherapists.

Therefore, our exploratory study aims to 1) describe the socio-cultural characteristics within the population of people with NSMSP visiting Dutch primary care physiotherapy, and 2) to determine the associations between socio-cultural factors (i.e., education level, employment status, living situation, relationship status, religion or spiritual beliefs, spoken language at home, self-perceived proficiency Dutch, self-reported cultural background, and migration background) and pain intensity, disability, and HRQoL in people with NSMSP visiting Dutch primary care physiotherapy.

Methods

Study design

This exploratory cross-sectional study, part of the Cultural Pain Diversity prospective cohort study (CuPiD-study), was reported according to the STROBE-guidelines. The CuPiD-study was approved by the Medical Research Ethics Committees United (MEC-U, reference number W19.075).

Setting and participants

Patients with NSMSP were recruited from 35 Dutch primary care physiotherapy facilities in Rotterdam and the South-West area of the Netherlands between August 2019 and November 2021. New patients and patients currently under treatment were screened for eligibility by their physiotherapist and received an information letter about the study procedures and invitation to participate if they; 1) had NSMSP in the region of the lower back, neck, shoulder(s), hip(s), knee(s) or a combination of these, 2) were between 18–80 years of age, and 3) were sufficiently proficient in Dutch to understand and fill out questionnaires. Patients with specific musculoskeletal pain caused by trauma or inflammation, with neurological, oncological or spinal pathologies, who recently underwent surgery and pregnant women were excluded [23]. Upon accepting the invitation, email addresses were registered online by the physiotherapist. Following registration, an email was sent with a link to the digital informed consent form. All participants provided informed consent.

Data collection

Data were collected using online Limesurvey© and Gemstracker software©. Participants completed self-reported questionnaires including questions about (1) demographic and health-related factors, (2) pain-related factors, and (3) socio-cultural factors, and standardized measures for pain intensity, pain-related disability and HRQoL. Reminder emails were sent after one and two weeks when questionnaires were not completed. After three weeks, participants who did not respond were contacted by telephone.

Outcome variables

Mean pain intensity over the past week was measured using the 11-point Numeric Pain Rating Scale (NPRS), ranging from ‘0’ (no pain) to ‘10’ (maximum pain) [24].

The Pain Disability Index (PDI) measured the influence of pain on daily life in seven sub-scales scored on a 11-point numeric scale, added up to a total score (0 to 70). Higher scores indicate more experienced functional limitations [25].

The Short Form Health Survey (SF-12) assessed HRQoL. This 12-item subset of the SF-36 questionnaire measures eight general, physical, social, and emotional health aspects. Two subscales were derived: the Physical Component Summary (PCS) indicating the physical HRQoL and the Mental Component Summary (MCS) indicating the mental HRQoL. Summary scales based on the SF-12 correlate highly with the SF-36. Higher scores on the SF-12 mean higher HRQoL [26].

Socio-cultural variables

Participants’ social background was assessed using self-reported questions regarding highest completed education level, employment status, living situation, and relationship status. Cultural background was described through questions on religion or spiritual beliefs, spoken language at home, self-perceived proficiency in Dutch, self-reported cultural background, country of birth, and country of birth from both parents. Based on the Dutch “Centraal Bureau voor de Statistiek” (CBS) definition, if the participant or at least one parent was born in another country it was classified as having a migration background [27]. Further details on all variables are provided in Table 1.

Covariates

Demographic covariates included self-reported sex (*male, female, other*) and age (*years*). Health-related factors included smoking (*yes/no*), Body Mass Index (BMI) (calculated from height (*cm*) and weight (*kg*)) [28], and presence of co-morbidity (*yes/no*). The Mental Health Inventory (MHI-5) was used to examine mental health. Sum scores were derived with a scale of 0 to 100, with higher scores indicating better mental health [29]. Pain-related data included current use of analgesics (*yes/no*) and chronic widespread pain (CWP). The Margolis Pain Drawing [30] measured CWP using the American College of Rheumatology (ACR) criteria. CWP was defined as pain persisting ≥ 3 months, located axially, bilaterally, and above and below the waist [31].

Descriptive variables

Additional pain-related data were collected to describe the study population, including NSMSP location (*low back, neck, shoulder, hip, knee, other*) and recurrence of

complaints (*yes, no, other*). Pain duration was reported in weeks and categorized as acute (0 to 11 weeks) or chronic (≥ 12 weeks) based on IASP classification [32].

Study size

Sample size for the longitudinal cohort study was based on the potential number of patients with NSMSP visiting Dutch physiotherapy practices between August 2019 and November 2021 [2]. Accounting for a 20% loss-to-follow up, the available sample size of approximately 1440 participants was considered sufficient based on the one in ten rule, which is a heuristic that for every predictor about 10 observations are required [33]. In this cross-sectional baseline study, including a total of 17 variables, the baseline sample size of 1350 participants enables the examination of associations with the nine socio-cultural variables while effectively controlling for the eight potential confounders.

Statistical methods

Descriptive analyses, including frequencies for categorical variables and means with standard deviations (SD) for continuous variables (median and IQR when not normally distributed), were used to describe the characteristics of the study population and to report missing values and outliers. Missing data were not imputed; an available-case analysis with pairwise deletion was used instead. For data analysis purposes, socio-cultural variables with overlapping or small-sample categories were merged or dichotomized (Table 1). Self-reported cultural background, religion or spiritual beliefs, living situation, and relationship status were dichotomized. Spoken language at home and employment status were consolidated into three categories.

To explore the socio-cultural variables associated with pain intensity, pain-related disability, and HRQoL, multiple linear regression models were built for each outcome variable using forward stepwise variable selection. This procedure aligns with our exploratory goal of identifying the most informative variable sets. A standard automated method, preceded by pre-processing, was used to avoid highly multicollinear sets of variables. Variable selection is considered essential to avoid biased estimates from related variables and to reduce the risk of overfitting. Since HRQoL consisted of the physical HRQoL subscale and the mental HRQoL subscale, separate models were developed for each. Initially, a crude model was constructed using forward variable selection to include all independent socio-cultural variables and explore their

associations with the outcome variable. Subsequently, all covariates were added to adjust for potential confounding. Akaike's information criterion (AIC) was used to assess the quality of the regression model compared to each previous model, accounting for model complexity. For each final regression model the adjusted R^2 was reported as a more easily interpretable measure of model fit, explaining the proportion of variance in the outcome variable accounted for by the socio-cultural variables. The reported regression coefficients (β) described the direction and magnitude of the association between the outcome and the socio-cultural variables [33]. Multicollinearity was evaluated by the variance inflation factor (VIF), excluding collinear variables exceeding a VIF 5 [34]. Assumptions of homogeneity of variance, normality of residuals and linearity were checked using scatterplots of the standardized residuals against regression standardized predicted value, histograms, and QQ-plots [33]. Statistical analyses were performed using SPSS 28.0.

Results

Participants

A total of 1674 patients met the inclusion criteria and were invited for study participation (Fig. 1). After invitation 231 patients did not respond and 44 patients canceled the invitation due to time constraints or personal issues. In total, 1350 participants with NSMSP were included (81% response rate).

As shown in Table 2, the majority of participants were female (64%), non-smoking (86%), and reported no comorbidities (70%). Most participants reported NSMSP complaints in the lower back (22%) and shoulder(s) (24%). More than half (55%) suffered from chronic NSMSP. The majority was self-perceived native Dutch speakers (84%), 69% was employed, and 24% of the participants had a migration background. Secondary vocational school was the main reported level of education (39%), followed by higher professional education (29%). Missing values ranged from 0.1% (pain duration) to 0.7% (MHI-5).

Socio-cultural associates of pain intensity

The final multiple linear regression model for outcome pain intensity, after controlling for covariates, included migration background, employment status, education level and spoken language at home, which accounted for 16.6% explained variance (adjusted R^2 0.166)(Table 3).

Table 1

Overview of survey questions, answer options, and categorization for data analysis of the socio-cultural variables.

Variable name	Survey question	Answer options	Categorization for data analysis
Migration background*	In which country were you born?	The Netherlands, The Netherlands Antilles, Suriname, Turkey, Morocco, Cape Verde, Indonesia, Other (please specify)	Dichotomized: No migration background (0) vs Migration background (1)
	In which country was your mother born?	Same answer options as above	
	In which country was your father born?	Same answer options as above	
Self-reported cultural background	How would you describe your own cultural background?	Dutch, Antillean, Surinamese, Turkish, Moroccan, Cape Verdean, Indonesian, Other (please specify)	Dichotomized: Dutch (0) vs Other cultural background (1)
Religion or spiritual beliefs	How would you describe your religious or spiritual background?	Roman Catholic, Protestant, Dutch Reformed, Christian Reformed, Jewish, Islamic, Buddhist, Atheist, Other (please specify)	Dichotomized: No religious or spiritual beliefs (<i>Atheist, Other; no religious or spiritual beliefs</i>) (0) vs Yes, religious or spiritual beliefs (1)
Self-perceived proficiency in Dutch	How well do you think you master the Dutch language?	Native speaker, Good, Moderate, Insufficient	Analyzed as categorical
Spoken language at home	Which language do you speak at home?	Dutch, Turkish, Arabic (Moroccan), Surinamese, Papiamentu, Other (please specify)	Grouped: Dutch (0), Dutch combined with foreign language (1), Foreign language (2)
Education level	What is your highest completed level of education?	No education, Primary school, Secondary school, Secondary vocational school, Higher professional education, University, Other (please specify)	Analyzed as categorical
Employment status	How would you describe your employment status?	Employed (paid), Unemployed, Volunteer or having unpaid work, Stay-at-home wife/husband, Student, Other (please specify)	Grouped: Employed (0), Unemployed (1), Student (2) ^a
Relationship status	What is your current marital status or relationship status?	Single, Living together (unmarried), Married, Divorced, Widow/widower, Other (please specify)	Dichotomized: Alone (<i>Single, Divorced, Widow/widower</i>) (0) vs In relationship (<i>Living together, Married or Other; in relationship</i>) (1)
Living situation	What is your current living situation?	I live alone, I live together with my partner, I live together with my child/children, I live together with my partner and child/children, Other (please specify)	Dichotomized: Living alone (0) vs Living together with other people (1)

* Migration background is based on the Dutch “Centraal Bureau voor de Statistiek” (CBS) definition, if one of the participants’ parents or self was born in another country it was classified having a migration background [27].

^a In case of multiple answers, the primary occupation/status was selected.

Migration background ($\beta = .447$, $p < .001$), unemployment ($\beta = .279$, $p .028$) and foreign language spoken at home ($\beta = .827$, $p .004$) were associated with on average higher NPRS scores, indicating higher pain intensity compared to no migration background, employment and Dutch spoken at home. Category student was associated with on average lower pain intensity ($\beta = -.491$, $p .031$) compared to the employed category. A university education level ($\beta = -.731$, $p < .001$) and higher professional education level ($\beta = -.358$, $p .003$) were negatively associated with pain

intensity, showing lower pain intensity compared to no education.

Socio-cultural associates of disability

After controlling for covariates, the final multiple linear regression model for disability included migration background, education level, spoken language at home, self-perceived proficiency in Dutch, and living situation (adjusted R^2 0.235) (Table 4). Migration background ($\beta = 3.997$, $p < .001$), education level secondary vocational

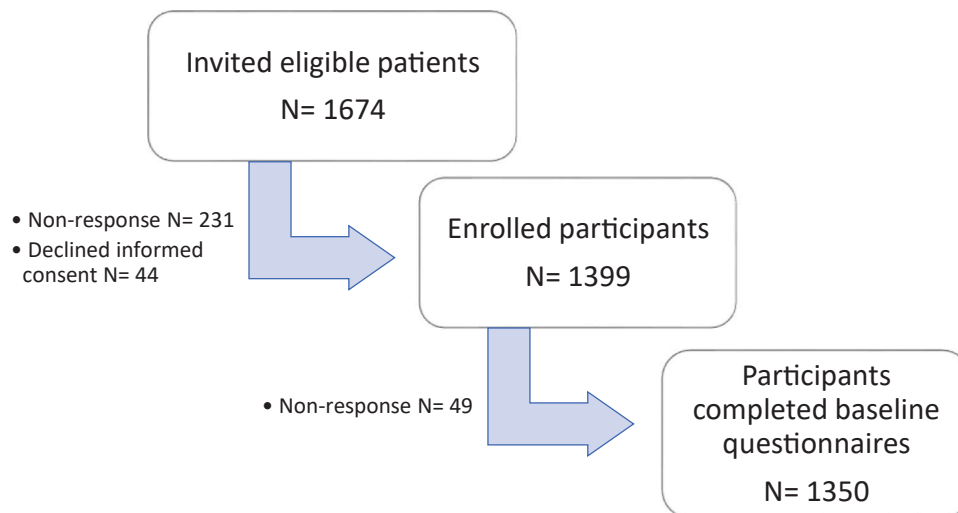


Fig. 1. Selection procedure of the study sample. The CuPiD-study baseline, 2019 to 2021, The Netherlands ($n = 1350$).

Table 2
Demographic and socio-cultural characteristics study population.

Factor	Category	Number (%) [*]
Sex ($n = 1350$)	Male	487 (36)
	Female	862 (64)
	Other	1 (0)
Age mean, SD ($n = 1342$)	Years	46.6 (15.4)
BMI ^a mean, SD ($n = 1341$)	kg/m ²	26.4 (4.7)
Smoking ($n = 1350$)	Yes	190 (14)
	No	1160 (86)
Co-morbidity ($n = 1350$)	Yes	410 (30)
	No	940 (70)
MHI-5 ^b mean, SD ($n = 1340$)	0 to 100	71.6 (16.5)
Location NSMSP ($n = 1350$)	Low back pain	302 (22)
	Neck pain	229 (17)
	Shoulder pain	321 (24)
	Hip pain	70 (5)
	Knee pain	130 (10)
	Combined spinal pain	111 (8)
	Other location in lower extremity	72 (5)
	Other location in upper extremity	39 (3)
	Other	76 (6)
Pain duration ($n = 1348$)	Acute (0 to 11 weeks)	603 (45)
	Chronic (≥ 12 weeks)	745 (55)
Recurrent complaints ($n = 1350$)	Yes	803 (60)
	No	489 (36)
	Other	58 (4)
Chronic widespread pain ($n = 1346$)	Yes	278 (21)
	No	1068 (79)
Use of analgesics ($n = 1347$)	Yes	348 (26)
	No	999 (74)
Migration background ($n = 1343$)	No	1017 (75)
		326 (24)

Table 2 (Continued)

Factor	Category	Number (%) [*]
	Yes	
Self-reported cultural background (<i>n</i> = 1344)	Dutch	1140 (85)
	Other cultural background	204 (15)
	Antillean	9 (4)
	Surinamese	25 (12)
	Turkish	20 (10)
	Moroccan	24 (12)
	Cape Verdean	4 (2)
	Indonesian	15 (7)
	Dutch mixed with another culture	33 (16)
	Other	74 (36)
Religion or spiritual beliefs (<i>n</i> = 1344)	No	515 (38)
	Yes	829 (61)
Self-perceived proficiency in Dutch (<i>n</i> = 1344)	Native speaker	1141 (84)
	Good	179 (13)
	Moderate	22 (2)
	Insufficient	2 (0)
Spoken language at home (<i>n</i> = 1343)	Dutch	1245 (92)
	Dutch combined with foreign language	45 (3)
	Foreign language	53 (4)
Education level (<i>n</i> = 1343)	No education	3 (0)
	Primary school	24 (2)
	Secondary school	249 (18)
	Secondary vocational school	531 (39)
	Higher professional education	385 (29)
	University	151 (11)
Employment status (<i>n</i> = 1343)	Employed	939 (69)
	Unemployed	329 (24)
	Student	82 (6)
Relationship status (<i>n</i> = 1343)	Alone	353 (26)
	In relationship	990 (73)
Living situation (<i>n</i> = 1343)	Living alone	207 (15)
	Living together with other people	1136 (84)
NPRS ^c mean, SD (<i>n</i> = 1347)	0 to 10	4.72 (2.1)
PDI ^d mean, SD (<i>n</i> = 1344)	0 to 70	24.5 (15.2)
SF-12 PCS ^e mean, SD (<i>n</i> = 1338)	0 to 100	43.6 (8.9)
SF-12 MCS ^e mean, SD (<i>n</i> = 1338)	0 to 100	50 (9.6)

^{*} Numbers and percentages unless stated otherwise. Percentages are rounded to whole numbers. Percentages below of ≤ 0.4 were rounded down to 0.

^a Body Mass Index, following WHO criteria [28]: BMI (kg/m²) 18 to 24.9 = healthy weight, BMI (kg/m²) 25.1 to 30 = overweight.

^b Mental Health Inventory-5.

^c Average pain intensity in the last 7 days scored on the Numeric Pain Rating Scale.

^d Pain Disability Index sumscore.

^e SF-12 Physical Component Score for physical HRQoL and SF-12 Mental Component Score for mental HRQoL.

Table 3

Adjusted multiple linear regression model for pain intensity (NPRS).

Adjusted R ² .166	β	Std. Error	p^*	95% Confidence interval
Migration background	.447	.130	< .001*	(.191; .703)
Employment status				
Unemployed vs employed	.279	.127	.028*	(.030; .528)
Student vs employed	-.491	.227	.031*	(-.937; -.045)
Education level				
University vs no education	-.731	.175	< .001*	(-1.074; -.388)
Higher professional education vs no education	-.358	.121	.003*	(-.596; -.121)
Spoken language at home				
Foreign vs Dutch	.827	.287	.004*	(.263; 1.391)

P^* , significant p -value < 0.05. Associations are adjusted for covariates sex, age, BMI, smoking, co-morbidity, MHI-5, use of analgesics and chronic widespread pain (CWP).

Table 4

Adjusted multiple linear regression model for disability (PDI).

Adjusted R ² 0.235	β	Std. Error	P^*	95% Confidence interval
Migration background	3.997	1.000	< .001*	(2.036; 5.959)
Education level				
Secondary vocational school vs no education	2.838	.761	< .001*	(1.346; 4.330)
Primary school vs no education	6.808	2.808	.015*	(1.299; 12.316)
Spoken language at home:				
Foreign language vs Dutch	-4.039	1.999	.043*	(-7.961; -.118)
Self-perceived proficiency in Dutch				
Good proficiency vs native speaker	2.818	1.240	.023*	(.385; 5.250)
Living situation				
Living together vs living alone	2.306	1.027	.025*	(.292; 4.321)

P^* , significant p -value < 0.05. Associations are adjusted for covariates sex, age, BMI, smoking, co-morbidity, MHI-5, use of analgesics and chronic widespread pain (CWP).

school ($\beta = 2.838$, $p < .001$) and primary school ($\beta = 6.808$, $p .015$), and good Dutch proficiency ($\beta = 2.818$, $p .023$) were positively associated with PDI, indicating on average higher disability scores compared to no migration background, no education and a self-perceived native-level Dutch. A foreign language spoken at home was associated with on average lower disability ($\beta = -4.039$, $p .043$) compared to the Dutch-speaking category. Living situation was positively associated with PDI, indicating that living together was associated with higher disability compared to living alone.

Socio-cultural associates of HRQoL

Socio-cultural factors education level, spoken language at home, living situation, and employment status were, after controlling for covariates, associated with physical HRQoL and accounted for 24.5% explained variance (adjusted R² 0.245) (Table 5). University education level was positively

associated with SF-12 PCS ($\beta = 1.436$, $p .038$), indicating a slightly higher physical HRQoL compared to no education. Unemployment ($\beta = -1.709$, $p .004$), living together ($\beta = -1.332$, $p .027$), and Dutch combined with a foreign language spoken at home ($\beta = -3.317$, $p .006$) were negatively associated with physical HRQoL.

After controlling for covariates, the final multiple linear regression model for mental HRQoL included migration background, education level, and self-perceived proficiency in Dutch, which accounted for 62.9% explained variance (adjusted R² 0.629). Migration background ($\beta = -1.475$, $p < .001$) and a moderate Dutch proficiency ($\beta = -3.805$, $p .004$) were associated with on average lower mental HRQoL. Primary school education level compared to no education was associated with on average better mental HRQoL ($\beta = 3.293$, $p .008$). Assumptions of homogeneity of variance, normality of residuals, and linearity were met for all models.

Table 5

Adjusted multiple linear regression model for physical HRQoL (SF-12 PCS) and mental HRQoL (SF-12 MCS).

	β	Std. Error	P^*	95% Confidence interval
Physical HRQoL (SF-12 PCS) Adjusted R² 0.245				
Education level				
University vs no education	1.436	.690	.038*	(.083; 2.788)
Employment status				
Unemployed vs employed	-1.709	.584	.004*	(-2.855; -.562)
Spoken language at home				
Dutch combined with foreign language vs Dutch	-3.317	1.195	.006*	(-5.661; -.972)
Living situation				
Living together vs living alone	-1.332	.601	.027*	(-2.511; -.152)
Mental HRQoL (SF-12 MCS) Adjusted R² 0.629				
Migration background	-1.475	.391	< .001*	(-2.242; -.709)
Education level				
Primary school vs no education	3.293	1.234	.008*	(.872; 5.713)
Self-perceived proficiency in Dutch				
Moderate proficiency vs native speaker	-3.805	1.309	.004*	(-6.374; -1.236)

P^* , significant p -value < 0.05. Associations are adjusted for covariates sex, age, BMI, smoking, co-morbidity, MHI-5, use of analgesics and chronic widespread pain (CWP).

Discussion

This exploratory cross-sectional study found that socio-cultural factors, including migration background, unemployment and lower education levels, were associated with on average poorer pain, disability, and HRQoL in people with NSMSP visiting Dutch primary care physiotherapy. Migration background was associated with higher pain intensity, disability and poorer mental HRQoL. While unemployment was associated with higher pain intensity and lower physical HRQoL. Overall, higher education levels were associated with better pain intensity and HRQoL. Socio-cultural characteristics of NSMSP patients in Dutch primary care physiotherapy, reflected demographics similar to national statistics [35]. Lower SES (based on education and employment) and poorer self-rated health are more common in cities like Rotterdam, underscoring health disparities in the Netherlands [8].

Overall, our study found negative associations between migration background, unemployment and NSMSP outcomes. Consistent with prior studies, mainly conducted in the US, associations were found between migration background and poorer outcomes in pain, disability, and health-related outcomes [12,13]. Comparative studies in Europe indicate that migrants and ethnic minorities report more severe (chronic) pain, limitations, and lower perceived health [20,35]. These disparities are often linked to SES, social support, systemic inequalities, and discrimination, which tend to disproportionately affect people with a migration background [13,36]. Unemployment was associated with higher pain intensity and lower physical HRQoL. The impact of employment status, alongside education level, income, and job type has been extensively studied as components of SES or SEP [5,6]. Although full-time students reported lower pain intensity compared to employed individuals, job type and income were not further explored

in this study. Additionally, higher education was associated with on average less pain and better HRQoL [5]. In contrast, we also found that, for category primary and secondary education, higher education was associated with greater pain-related disability. A recent study on physiotherapy patients highlights how differences in the categorization of social determinants complicate comparisons with other research [37]. Since most European studies use general health data, data on NSMSP in primary care physiotherapy settings are limited.

Mixed results were observed regarding living situation, spoken language at home and self-perceived proficiency in Dutch. Living with others, typically considered a source of social support, was associated with worse disability and physical HRQoL, which contrasts with previous research linking social support to better pain outcomes [8,38]. This suggests that the benefits may extend beyond simply having a social network. Literature identifies language proficiency as a key social determinant of health, often linked to health inequities through impaired healthcare communication [9]. Nevertheless, our study yielded inconclusive results regarding spoken language at home and self-perceived language proficiency.

No associations were found for religion or spiritual beliefs, relationship status, and self-reported cultural background. While some studies report weak links between religiosity and pain in people with MSP [4,15], our findings may differ due to cultural and religious context differences between the Netherlands and other high-, middle-, and low-income countries [4,39]. Furthermore, other key aspects of religiosity and spirituality, such as religious coping, were not captured in our study. Similarly, differences in how self-reported cultural background was operationalized may explain the contrast between our research and the majority of prior studies on cultural factors conducted in the US, which often involved broad ethnicity and race comparisons [11,13].

Our results enhance understanding of the association between socio-cultural factors and pain, disability, and HRQoL in NSMSP patients, highlighting existing health disparities within this group. It may increase awareness among physiotherapists about the potential impact on treatment outcomes and encourage care improvements.

Limitations and future directions

Our study has several limitations, with three key ones to highlight. One major limitation is the exclusion of individuals with limited literacy and Dutch language proficiency, resulting in a lack of insight into their situation. Future studies should consider multilingual questionnaires or interpreters to improve accessibility for this group. Second, while stepwise multiple linear regression fits our exploratory approach, it carries limitations such as potential underestimation of standard errors and overestimation of P-values [40]. Despite precautions, such as reporting adjusted R-squared to account for the large number of variables, the reported values should be interpreted with caution. Finally, the cross-sectional design limits this study to associations descriptions, underscoring the need for longitudinal research to examine long-term associations and the predictive role of socio-cultural factors. In addition to individual socio-cultural factors, future research should consider meso- and macro-level factors, such as perceived injustice and ethnic discrimination, which are linked to increased pain severity and disability [36]. A mixed-methods approach could enhance understanding of socio-cultural factors across various levels together with the personal challenges that individuals with NSMSP face [8].

This exploratory study, with a large sample of 1350 participants from multiple Dutch primary care physiotherapy facilities, is the first of its kind. Findings reveal several associations between socio-cultural factors and pain, disability, and HRQoL in NSMSP patients, highlighting existing health disparities within this group. Further research is needed to explore longitudinal relationships between socio-cultural factors and NSMSP.

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Conflict of interest statement

All authors have no conflict of interest to declare.

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