

## Observational Studies

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# Equal access to pain rehabilitation in Swedish tertiary care. Are sociodemographic factors associated with selection to rehabilitation?

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### Abstract

**Objectives:** To investigate if sociodemographic factors are associated with selection to an interdisciplinary pain rehabilitation program (IPRP) in Swedish tertiary care, in an intersectional perspective.

**Methods:** This study involved 39,346 patients referred to tertiary care, who were registered in the Swedish Quality Registry for Pain Rehabilitation during 2009–2016. Self-reported sociodemographic data, and data related to pain and its consequences, were registered prior to IPRP (at baseline). Self-reported data on pain and its consequences were also registered directly after the IPRP and at a 12 months'

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follow-up. Patients not selected for IPRP reported only baseline data. The statistical analyses used logistic regressions including interaction terms, and the results were analyzed in an intersectional framework to emphasize unequal health care.

**Results:** Sex, age, education, and region of birth were found to influence the likelihood of being selected to IPRP. Non-Nordic-born patients with elementary education had the lowest proportion of selection to IPRP, with a similar proportion for men and women. Other subgroups showed a smaller difference between Nordic and non-Nordic countries in the proportion selected to IPRP. For several groups, longer education had a positive impact on the proportion of selection. Selection increased with age to a peak in middle age and then decreased. Unexpectedly, the youngest patients were less likely than middle-aged patients to be selected.

**Conclusions:** In Swedish tertiary care, sex, age, education, and region of birth influence selection to IPRP as combinations but not necessarily as single factors. More knowledge is needed to ensure equal, knowledge-based rehabilitation for patients with chronic pain. The regional ethics review board in Uppsala (IRB/REC 2018/036) and the Swedish ethical review authority (IRB/REC 2020-00828) issued ethical approvals.

**Keywords:** chronic pain; sociodemographic factors; selection bias; rehabilitation; registries

## Introduction

Chronic pain affects about 20 % of the European population, and is widely recognized as a major public health issue [1]. The prevalence varies across populations based on factors such as age, sex, education, socio-economic background, and occupational position [1–4]. Effective treatment and rehabilitation of chronic pain are of major importance, to decrease both individual suffering and the economic burden on society [5]. Interdisciplinary pain rehabilitation programs (IPRPs) are suggested to improve function and quality of life in patients with chronic pain [6, 7]. Swedish IPRP are described elsewhere [8, 9]. In Sweden, patients with chronic pain receive initial rehabilitation at primary healthcare

centers. If more specialized rehabilitation is needed, patients are referred to tertiary care, where IPRPs are commonly used [8].

If a referral from primary care is accepted, a common approach is to invite the patient to a biopsychosocial assessment including a pain analysis, an analysis of physical function (biomedical) and of the pain problem regarding psychosocial aspects [10]. After assessment there is usually a team discussion to decide whether the patient should attend IPRP or not [8].

The Swedish Health Care Act states that healthcare should be provided on equal terms, the need for care being the strongest priority guidance principle [11]. An appropriate theoretical framework to study potential inequalities is that of intersectionality. Intersectionality examines how social identities and positions – like ethnicity, gender, sexual orientation, socioeconomic status, and disability – intersect to shape individual experiences [12]. These intersecting identities and positions influence access to resources and reflect broader systems of privilege and discrimination [12]. Results from the few articles that investigate the selection of patients to Swedish IPRPs suggest that selection is biased [13–16]. Women who reported an elementary school education level were referred to IPRP less often than women who reported university education [13]. One study explored patient-perceived inequities in access to tertiary pain rehabilitation, particularly in relation to gender, social status, and diagnosis [15]. Another study, involving perceptions from patients and healthcare professionals, observed how gender norms and sociocultural context influence both patient experiences and professional perceptions in chronic pain rehabilitation, leading to unequal care through biased views on pain legitimacy, patient suitability, and access to treatment [14]. More knowledge is needed to indicate whether there are sociodemographic inequalities in the selection of patients with chronic pain for rehabilitation in Swedish tertiary care [16].

The aim of this study was to investigate if sociodemographic factors are associated with selection to IPRP in Swedish tertiary care, using an intersectional perspective.

## Methods

### Materials

Data for January 2009–July 2016 were retrieved from the Swedish Quality Registry for Pain Rehabilitation (SQRP), covering most Swedish tertiary care pain clinics [17]. To be included in the registry patients reported pain for  $\geq 3$  months

that strongly affects life, age  $\geq 18$ , and no further medical examinations required [18, 19].

Self-reported sociodemographic data, and pain-related data, were registered prior to IPRP (at baseline). Self-reported pain- and health-related data were also registered directly after and at 12 months' follow-up. Patients not selected for IPRP reported only baseline data.

Data of 50,269 registrations were retrieved, and 41,644 were used after data cleaning. One variable, identifying assessment only or selection to IPRP after the assessment, was revised in the register in August 2016. During August – December 2016 both the old and new versions were used. Hence, these data were excluded, leaving 39,346 patients (Figure 1).

Uppsala regional ethics review board (ref 2018/036) and the Swedish ethical review authority (ref 2020-00828) issued ethical approvals.

*Selection to rehabilitation* was dichotomized as 0=assessment only and 1=assessment followed by selection to IPRP.

Sociodemographic factors were: *sex* (man, woman), *age* (six categories), *education* (elementary school, upper secondary school, university, other), and *region of birth* (Sweden, other Nordic countries, other European countries, non-European countries).

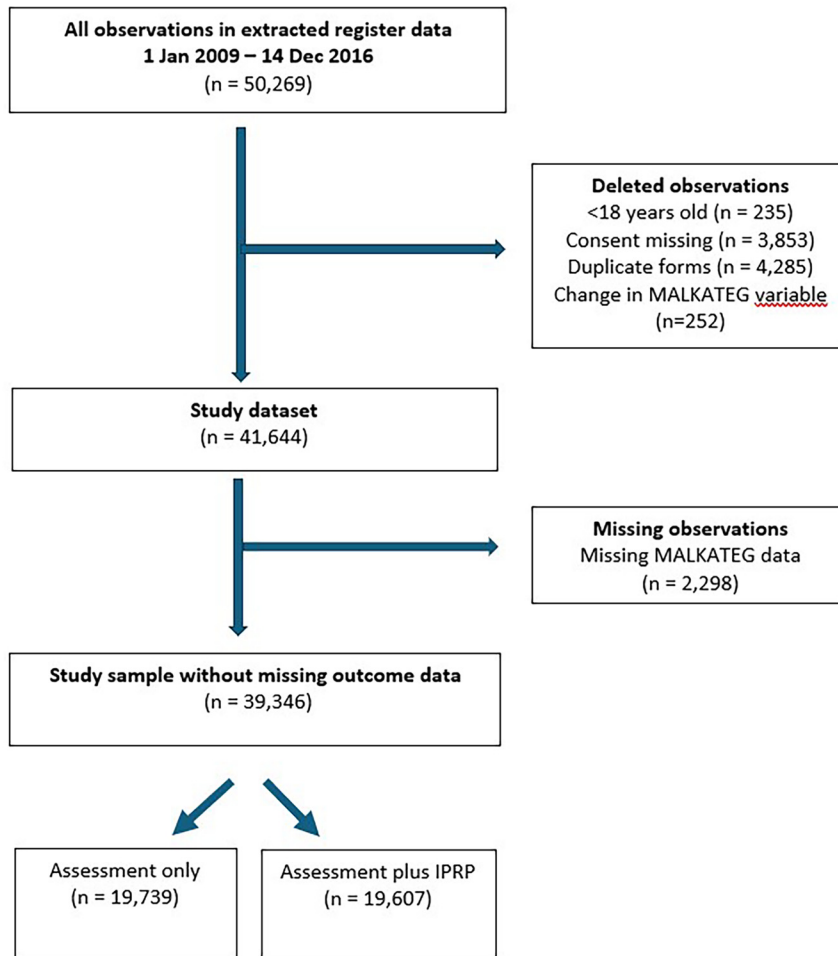
Possible confounders used in adjusted analyses were: *duration* of current pain period (90–365 days, 1–2 years, 2–5 years, 5–10 years,  $\geq 10$  years), *pain frequency* (periodic/persistent), *pain intensity* (numeric pain rating scale 0–10 [20]), *pain sites* (18 possible locations on each body side), *physical and mental function* (Physical component summary, Mental component summary from Short-Form 36 Health Survey [21]) and *anxiety and depression symptoms* (Hospital Anxiety and Depression Scale [22]).

Although the rationale for this study is grounded in investigating potential inequities, the term “unequal healthcare” will be used to assess whether differences exist between various groups and their intersections. The current data does not allow us to determine whether the observed inequalities are indicative of underlying inequities.

### Data analysis

For the estimated proportion of *selection to rehabilitation*, we calculated confidence intervals using Wilson score [23].

In the logistic regression, *age* was divided into six categories (18–29, 30–39, 40–49, 50–59, 60–69,  $\geq 70$ ) due to non-linear association with outcome. *Region of birth* was dichotomized to Nordic vs. non-Nordic countries, due to few observations in “other Nordic countries” ( $n=1,091$ , 2.8 %) and “other European countries” ( $n=2,140$ , 5.6 %).



**Figure 1:** Flowchart of study material. IPRP=interdisciplinary pain rehabilitation programs. The MALKATEG variable recorded whether patients received assessment only or IPRP in addition to assessment; two versions of this variable were used during August–December 2016, and so observations from this period were excluded.

Collinearity between explanatory variables was checked using Spearman's rank correlation coefficient ( $r_s < 0.7$ ), and for categorical variables also box-plots and cross tables. No indications were found.

Logistic regression was used to analyze the association between *selection to rehabilitation* and sociodemographic factors, both in single-variable models and in unadjusted and confounder-adjusted multivariable models. Confounding variables with  $p < 0.25$  were included in the final confounder-adjusted models.

Two- and three-variable interactions between the socio-demographic variables were analyzed in line with our intersectional aim. To simplify the interpretation of this analysis, Figure 2 presents the predicted proportion of selection to IPRP.

Model performance was evaluated via the area under the receiver operating characteristic curve (AUCROC), as is common in intersectional studies. AUCROC represents the probability that the model will rank a randomly chosen event higher than a randomly chosen non-event, and how well the model is capable of distinguishing between classes [24, 25]. Our aim was not to predict selection to rehabilitation

using sociodemographic variables, but in this study a high AUCROC would indicate unequal selection.

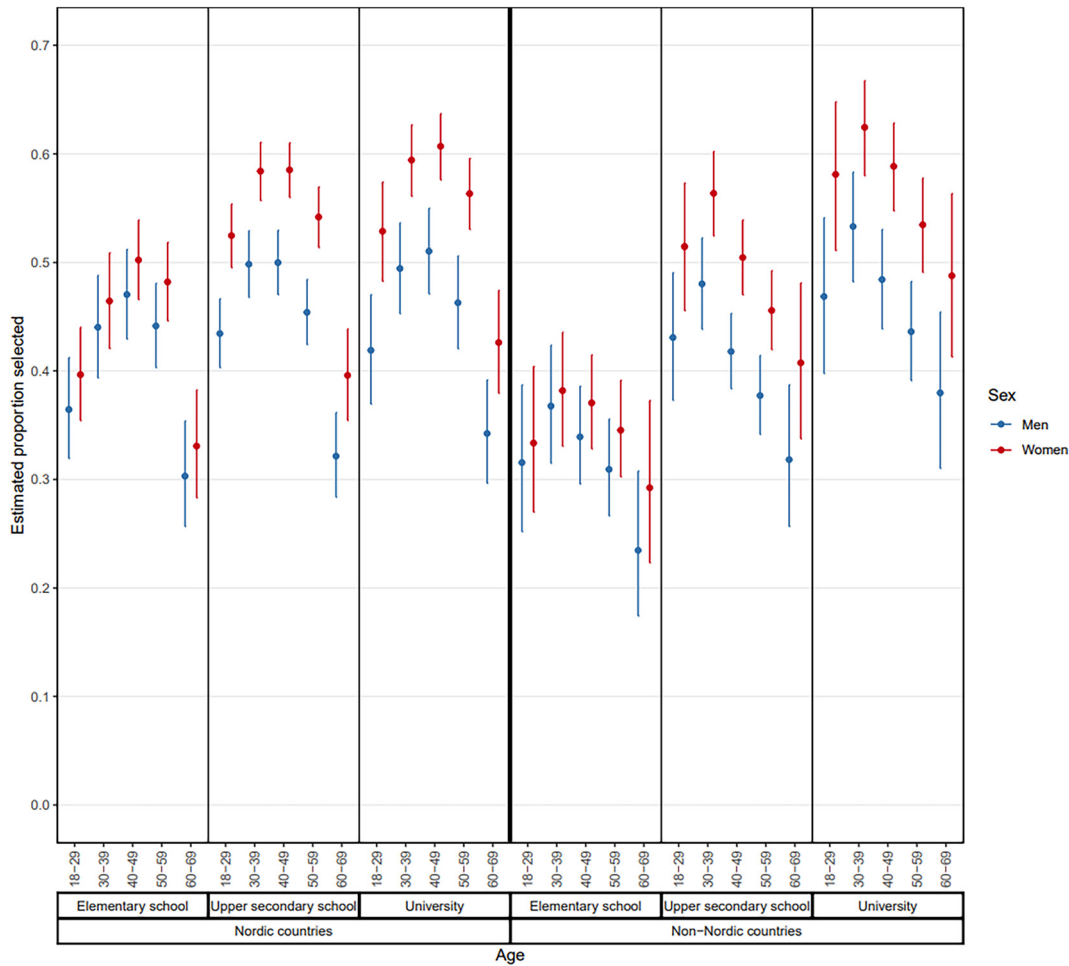
Version 28.0 of SPSS (IBM Corp., Armonk, NY) was used for statistical analyses.

## Results

### Descriptive statistics

The study included 39,346 patients: 11,076 (28 %) men and 28,270 (72 %) women. Mean age was 44 years (standard deviation: 12.0). Highest level of education was elementary school for 6,414 (17 %) patients and university level for 9,287 (24 %) patients. Most patients (31,051, 81 %) were born in a Nordic country. Perceived physical and mental health, anxiety, and depression were similar for men and women. Details of the descriptive data are given in Table 1.

In the unadjusted comparisons of the proportion selected to rehabilitation in the different sociodemographic groups (Table 2), the proportion was higher for women than men and



**Figure 2:** Estimated proportions selected for rehabilitation, based on means from the model including all explanatory variables (sex, age, education, and region of birth) as main effects and the statistically significant two-way interactions (sex \* education, age \* education, age \* region of birth, and education \* region of birth). The figure excludes the group with “other” education, due to a lack of information about length of education. It also excludes the  $\geq 70$  age group, as the national reimbursement system during 2008–2015 was intended to support return to work, and hence most rehabilitation units excluded or only partly included patients aged  $\geq 70$ .

higher for patients aged 30–49 than for the other age groups. Both patients with university education and patients with upper secondary school education showed higher proportions than the other educational groups, but the university group had a higher proportion than the upper secondary school group. The proportion of selection to rehabilitation was higher for patients who were born in Nordic countries than for those born in non-Nordic countries.

In the logistic regression models, all the explanatory variables were statistically significant ( $p < 0.001$ ) when included as main effects, both before and after adjustment for the health-related possible confounders. When the explanatory variables were included as main effects and as two- and three-way interactions, the following statistically

significant interaction terms were observed: sex \* education, age \* education, age \* region of birth, and education \* region of birth. These two-way interactions were also statistically significant when adjusted for the health-related potential confounders. Details of the different models (main effect models and interaction effect models, both unadjusted and adjusted for health-related possible confounders) are presented in the Supplementary Material.

The predicted values (model-based proportions) from the model including all main effects and the statistically significant two-way interactions are presented in Figure 2, to clarify the effect of the explanatory variables for the intersectional groups (i.e. all possible combinations of sex, age, education, and region of birth).

**Table 1:** Descriptive statistics for the study sample (n=39,346).

Number/variable/statistics	Total		Men		Women	
	n	%	n	%	n	%
<b>Sex (n=39,346)</b>	39,346	100	11,076	28.2	28,270	71.8
<b>Age category, (years) (n=39,346)</b>						
18–29	5,053	12.8	1,243	11.2	3,810	13.5
30–39	8,434	21.4	2,311	20.9	6,123	21.7
40–49	12,721	32.3	3,372	30.4	9,349	33.1
50–59	9,721	24.7	2,921	26.4	6,800	24.1
60–69	2,689	6.8	978	8.8	1,711	6.1
≥70	728	1.9	251	2.3	477	1.7
<b>Education (n=38,108)</b>						
Elementary school	6,414	16.8	2,179	20.4	4,235	15.4
Upper secondary school	20,071	52.7	5,963	55.9	14,108	51.4
University	9,287	24.4	1,996	18.7	7,291	26.6
Other	2,336	6.1	531	5.0	1,805	6.6
<b>Region of birth<sup>a</sup> (n=38,479)</b>						
Nordic countries	31,051	80.7	8,323	77.2	22,728	82.1
Non-nordic countries	7,428	19.3	2,463	22.8	4,965	17.9
<b>Pain duration (n=34,682)</b>						
90–365 days (1 year)	4,168	12.0	1,334	13.5	2,834	11.4
366–730 days (1–2 years)	4,773	13.8	1,379	14.0	3,394	13.7
731–1,825 days (2–5 years)	7,564	21.8	2,230	22.6	5,334	21.5
1,826–3,650 days (5–10 years)	6,668	19.2	1,915	19.4	4,753	19.1
≥3,651 days (≥10 years)	11,509	33.2	2,989	30.4	8,520	34.3
<b>Pain frequency (n=37,483)</b>						
Periodic	5,637	15.0	1,630	15.5	4,007	14.9
Persistent	31,846	85.0	8,872	84.5	22,974	85.1
	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>
<b>Pain intensity (0–10)<sup>b</sup> (n=37,755)</b>	7.0	1.83	6.8	1.90	7.0	1.80
<b>Pain sites (1–36)<sup>c</sup> (n=37,946)</b>	14.2	8.58	10.8	7.34	15.6	8.66
<b>Physical health<sup>d</sup> (n=35,378)</b>	29.0	8.57	30.0	8.53	28.6	8.56
<b>Mental health<sup>e</sup> (n=35,378)</b>	35.2	13.42	35.1	13.59	35.3	13.36
<b>Anxiety<sup>f</sup> (n=38,315)</b>	9.2	5.03	9.1	5.02	9.3	5.03
<b>Depression<sup>g</sup> (n=38,335)</b>	8.7	4.72	8.9	4.86	8.6	4.66

<sup>a</sup>Nordic countries: Sweden, Norway, Denmark, Finland and Iceland. <sup>b</sup>Average pain intensity during the previous seven days was registered using a numeric pain rating scale ranging from 0 (no pain) to 10 (worst possible pain). <sup>c</sup>Number of pain locations on the body, with a choice of 18 locations on each side.

<sup>d</sup>Physical component summary from the Short-Form-36 Health Survey (SF-36) scoring 0–100. Higher scores indicate better physical health. <sup>e</sup>Mental component summary from the SF-36 scoring 0–100. Higher scores indicate better mental health. <sup>f</sup>Total sum score from the Hospital Anxiety and Depression Scale (HADS) addressing anxiety, scoring 0–21. Higher scores indicate more anxiety. <sup>g</sup>Total sum score from HADS addressing depression, scoring 0–21. Higher scores indicate more depression. SD, standard deviation.

For both men and women, the group with the lowest proportion selected to IPRP consisted of those with elementary education born in a non-Nordic country, with similar proportion of selection for men and women. Patients with elementary education born in Nordic countries also showed similar proportions of selection for men and women. There was a large heterogeneity within groups. For men, the proportions ranged from 5.6 % to 47.0 % across different age groups in Nordic countries and 9.4 %–36.8 % in non-Nordic countries. Similar ranges were found for women: 5.9–50.2 % in Nordic countries and 7.8–38.2 % in non-Nordic countries.

The highest estimated proportion of selection to IPRP (62.5 %) was found among 30–39-year-old university-educated women born in a non-Nordic country. The corresponding group of men showed a proportion of 53.3 %. University-educated women aged 30–39 years born in a Nordic country showed a similar proportion (59.4 %) to their counterparts born in a non-Nordic country, while the corresponding group of men born in a Nordic country showed a proportion of 49.4 %.

The AUCROC for the model including statistically significant interactions but not adjusted for health confounders

**Table 2:** Proportion of patients selected to assessment only and to assessment followed by an interdisciplinary pain rehabilitation program (IPRP), and between-group ratios of selection using unadjusted comparisons.

Variable	Assessment only			Offered and accepted IPRP			Proportion selected to IPRP		Ratio selected to IPRP
	n	%	95 % CI	n	%	95 % CI	%	95 % CI	
<b>Sex</b>									
Men	6,192	31.4	30.73–32.02	4,884	24.9	24.31–25.52	44.1	43.17–45.02	0.85
Women	13,547	68.6	67.98–69.27	14,723	75.1	74.48–75.69	52.1	51.50–52.66	(reference)
<b>Age</b>									
18–29	2,623	13.3	12.82–13.77	2,430	12.4	11.94–12.86	48.1	46.71–49.47	0.88
30–39	3,841	19.5	18.91–20.02	4,593	23.4	22.84–24.02	54.5	53.39–55.52	(reference)
40–49	5,922	30.0	29.37–30.64	6,799	34.7	34.01–35.35	53.4	52.58–54.31	0.98
50–59	5,005	25.4	24.75–25.97	4,716	24.1	23.46–24.66	48.5	47.52–49.51	0.89
60–69	1,707	8.6	8.26–9.05	982	5.0	4.71–5.32	36.5	34.72–38.36	0.67
≥70	641	3.2	3.01–3.50	87	0.4	0.36–0.55	12.0	9.79–14.51	0.22
<b>Education</b>									
Elementary school	3,834	20.1	19.58–20.72	2,580	13.5	13.05–14.02	40.2	39.03–41.43	0.73
Upper secondary school	9,757	51.3	50.56–51.98	10,314	54.1	53.35–54.77	51.4	50.70–52.08	0.94
University	4,186	22.0	21.41–22.59	5,101	26.7	26.11–27.37	54.9	53.91–55.94	(reference)
Other	1,253	6.6	6.24–6.95	1,083	5.7	5.36–6.01	46.4	44.35–48.39	0.84
<b>Region of birth<sup>a</sup></b>									
Nordic countries	15,138	78.7	78.07–79.23	15,913	82.7	82.20–83.27	51.2	50.69–51.80	(reference)
Non-nordic countries	4,108	21.3	20.77–21.93	3,320	17.3	16.73–17.80	44.7	43.57–45.83	0.87

<sup>a</sup>Nordic countries: Sweden, Norway, Denmark, Finland and Iceland. CI, confidence interval.

was 0.60 (95 % CI: 0.592–0.603), and the AUCROC for the health-adjusted model was 0.61 (95 % CI: 0.606–0.618).

## Discussion

This study shows that an intersectional approach uncovers more complex patterns of inequality arising from the combined influence of multiple sociodemographic dimensions, compared to previous findings comparing inequalities in the selection to IPRP. Sex, age, education and birth-region influence the likelihood of being selected to IPRP, but our results challenge overly-simplistic one-dimensional interpretations. Instead our findings show heterogeneity within these social categories, highlighting the value of an intersectional perspective [26, 27].

The intersectional analysis showed that non-Nordic patients with elementary education had the lowest proportion of selection to IPRP, and the relevance of birth-region varied by educational level. To our knowledge this is the first time this result has been reported. One explanation could be the inverse care law, suggesting that those needing most healthcare are least likely to receive it [28]. Another explanation for the low selection could be the inability of some clinics to offer individually-adapted rehabilitation concerning language

comprehension or cultural differences [29]. Language barriers may limit participation; although Swedish patients have the right to an interpreter at healthcare visits, many pain rehabilitation units use language proficiency as an inclusion criterion to IPRP [8].

In both the Nordic and the non-Nordic-born group the proportion of selection increased by level of education. Previous research suggests that professionals' ideas about patients' suitability for IPRP might affect selection leading to better access to health-care for patients with higher education [14]. Patients reporting elementary school are described elsewhere as lacking in health-literacy and having lower-salary jobs [30]. These jobs may have less flexibility regarding in-person attendance and scheduling making it more difficult to attend IPRP. Also, patients with higher income are more likely to seek specialist care [31]. These findings may explain why patients with elementary education tended to be bypassed in the selection for IPRP.

The lower selection for patients with elementary school seemed independent of sex but differences were found between men and women, in women's favor, among patients with longer education. In another Swedish study, less-educated women were less often selected to IPRP than women with longer education, while statistical significance regarding education was not seen for men [13]. Why sex

seems to affect selection to IPRP for men and women, depending on levels of education and region of birth cannot be explained by our results. It is however intriguing and warrants further research.

Selection to IPRP increased with age to a peak in the middle age, and then decreased. Age was the only variable that had a similar pattern independent of other factors. Unexpectedly, the youngest patients were less likely than middle-aged patients to be selected. Since both patients and society would benefit from rehabilitation at an early stage, we find this result puzzling, requiring further investigations. The oldest patients (60–69 years) had the lowest proportion of selection, which may be due to the national reimbursement system during 2008–2015 supporting return-to-work. The general retirement age in Sweden during this period was 65 years, which may have influenced the selection to IPRP.

All pain rehabilitation units in Sweden report using patients' goals, motivation, and potential for change as inclusion criteria [8]. Assessment of these factors depends on the ideas of the individuals providing healthcare about patient suitability, potentially affected by stereotypical conceptions about factors like birthplace, education, and gender [14]. Providers find patients with background characteristics similar to themselves easier to interact with, and predict better outcomes for them [14]. This is in concordance with our results. It is important that this, probably often unaware, subjective and personal impact on selection to IPRP is recognized. Further research is needed to increase equality in selection to IPRP in this regard. Especially as patients themselves report perceived inequalities in IPRP access, noting that factors like gender, ethnicity, social status, and the status of certain diagnoses affect access, and that the likelihood of post-rehabilitation return-to-work is a factor influencing selection [15].

One key finding from our study is the usefulness of adopting an intersectional approach instead of over-simplistic models. Regarding birth region, the unadjusted analyses showed that Nordic-born patients were selected to a higher degree than non-Nordic-born patients; but in the intersectional analysis, this held true only among less-educated individuals. For other subgroups, the selection was similar between non-Nordic and Nordic countries, and a large variety was observed within the non-Nordic group in relation to education level and sex. This was a surprising result. Previous findings indicate barriers to pain treatment for socially marginalized groups, like migrants and other foreign-born patients [32]. Regarding sex, the unadjusted associations showed that women were more likely than men to be selected for IPRP, while the intersectional analysis revealed more complex and heterogeneous patterns highlighting both differences and similarities

between women and men. Our results emphasize the importance of using intersectional analyses.

The use of a national patient registry allowed us to include a large number of patients thereby increasing the reliability of our results. Another strength of the present study is the use of an intersectional analysis and the adjustment of possible confounding variables, all health related, to ensure that health status did not influence selection. However, the health-related factors available did not include the whole spectrum of health status, e.g. other medical conditions.

The categorization of birthplace into Nordic or non-Nordic is a limitation, as it elides the heterogeneity of a group that may include both patients raised in Sweden but born in another high-income country, and patients born and raised in a low-income country with little access to education and a lack of Swedish language skills. In our data, the non-Nordic subgroups (European/non-European) were too small to be analyzed.

Our findings about selection to IPRP after referral to tertiary care do not include selection to tertiary care from primary care, or other instances. Situations potentially affecting patients' opportunities for referral include precarious financial state, social situation [27], or living in rural areas too far to travel regularly to the hospital for rehabilitation sessions. Professionals in primary care may lack awareness of the actual rehabilitation possibilities in tertiary care. Additionally, it can be assumed that there is a variation in patients' ability to express their medical needs and in their knowledge about the possibility of self-referral that exists in the country.

Another limitation is that to our knowledge not all units register their assessments which means that the proportion selected in those units is too high. Some possible explanations may be that some units may select by reading the referral, some units may receive patients already selected by other units not registering, and finally units might not register these patients to save manpower. It can be argued that those units could select in ways that differ from our analysis, but on the other hand the large number included is an assurance of validity.

In conclusion, in Swedish tertiary care combinations of sex, age, education and region of birth influence selection to IPRP, but not necessarily as single factors. More knowledge is needed to ensure equal, knowledge-based rehabilitation for patients with chronic pain.

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**Research ethics:** Research involving human subjects complied with all relevant national regulations, institutional policies and is in accordance with the tenets of the Helsinki Declaration (as amended in 2013), and has been approved by the regional ethics review board in Uppsala (ref 2018/036) and by the Swedish ethical review authority (ref 2020-00828).

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## References

- Breivik H, Eisenberg E, O'Brien T. The individual and societal burden of chronic pain in Europe: the case for strategic prioritisation and action to improve knowledge and availability of appropriate care. *BMC Public Health* 2013;13:1229–43.
- Mills SEE, Nicolson KP, Smith BH. Chronic pain: a review of its epidemiology and associated factors in population-based studies. *Br J Anaesth* 2019;123:e273–e283.
- Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley JL 3rd. Sex, gender, and pain: a review of recent clinical and experimental findings. *J Pain* 2009;10:447–85.
- Jakobsson U. The epidemiology of chronic pain in a general population: results of a survey in southern Sweden. *Scand J Rheumatol* 2010;39:421–9.
- Stubhaug A, Hansen JL, Hallberg S, Gustavsson A, Eggen AE, Nielsen CS, et al. The costs of chronic pain – Long-term estimates. *Eur J Pain* 2024;28:960–77.
- Kurklinsky S, Perez RB, Lacayo ER, Sletten CD. The efficacy of interdisciplinary rehabilitation for improving function in people with chronic pain. *Pain Res Treat* 2016;2016:7217684–6.
- Bujak BK, Regan E, Beattie PF, Harrington S. The effectiveness of interdisciplinary intensive outpatient programs in a population with diverse chronic pain conditions: a systematic review and meta-analysis. *Pain Manag* 2019;9:417–29.
- Fischer MR, Schults ML, Stålnacke BM, Ekholm J, Persson EB, Löfgren M, et al. Variability in patient characteristics and service provision of interdisciplinary pain rehabilitation: a study using the Swedish national quality registry for pain rehabilitation. *J Rehabil Med* 2020;52:jrm00128:20201127.
- Svanholm F, Björk M, Löfgren M, Gerdle B, Hedevik H, Molander P, et al. Work interventions within interdisciplinary pain rehabilitation programs (IPRP) – frequency, patient characteristics, and association with self-rated work ability. *J Pain Res* 2023;16:421–36. 20230214.
- Bäckryd E. Pain assessment 3 × 3: a clinical reasoning framework for healthcare professionals. *Scand J Pain* 2023 23:268–72. 20230306.
- Sveriges riksdag [The Swedish Parliament]. Hälso-och sjukvårdslagen 2017. [*Health and Medical Services Act*]. [https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/halso-och-sjukvardslag\\_sfs-2017-30](https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/halso-och-sjukvardslag_sfs-2017-30).
- Bowleg L. The problem with the phrase women and minorities: intersectionality-an important theoretical framework for public health. *Am J Publ Health* 2012;102:1267–73.
- Hammarström A, Haukenes I, Fjellman Wiklund A, Lehti A, Wiklund M, Evengård B, et al. Low-educated women with chronic pain were less often selected to multidisciplinary rehabilitation programs. *PLoS One* 2014;9:e97134.
- Lehti A, Fjellman-Wiklund A, Stålnacke BM, Hammarström A, Wiklund M. Walking down 'Via Dolorosa' from primary health care to the specialty pain clinic – patient and professional perceptions of inequity in rehabilitation of chronic pain. *Scand J Caring Sci* 2017;31:45–53.
- Wiklund M, Fjellman-Wiklund A, Stålnacke BM, Hammarström A, Lehti A. Access to rehabilitation: patient perceptions of inequalities in access to specialty pain rehabilitation from a gender and intersectional perspective. *Glob Health Action* 2016;9:31542:20160826.
- Haukenes I, Hensing G, Stålnacke BM, Hammarström A. Does pain severity guide selection to multimodal pain rehabilitation across gender? *Eur J Pain* 2015;19:826–33.
- Nationella registret över smärtrehabilitering (NRS) [The Swedish Quality Registry for Pain Rehabilitation (SQRP)]. Specialistvård rapport 2017:1 [specialist care, report 2017:1], <https://www.ucl.uu.se/nrs/nrs-primaervard/arsrapporter-primarvord/aeldre-arsrapporter-specialistvard/arsrorter-2016-specialistvard> (Accessed 19 February 2025).
- Nationella registret över smärtrehabilitering (NRS) [The Swedish Quality Registry for Pain Rehabilitation (SQRP)]. Om NRS [about SQRP], <https://www.ucl.uu.se/nrs/om-nrs/om-registret> (Accessed 17 July 2025).
- Ghafouri N, Bäckryd E, Dragioti E, Rivano Fischer M, Ringqvist Å, Gerdle B, et al. Effects of interdisciplinary pain rehabilitation programs on neuropathic and non-neuropathic chronic pain conditions – a registry-based cohort study from Swedish quality registry for pain rehabilitation (SQRP). *BMC Musculoskelet Disord* 2023;24:357:20230506.
- Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine (Phila Pa 1976)* 2005;30:1331–4.
- Sullivan M, Karlsson J, Ware JE, Jr. The Swedish SF-36 health Survey – I. Evaluation of data quality, scaling assumptions, reliability and construct validity across general populations in Sweden. *Soc Sci Med* 1995;41:1349–58.
- Lisspers J, Nygren A, Söderman E. Hospital anxiety and depression scale (HAD): some psychometric data for a Swedish sample. *Acta Psychiatr Scand* 1997;96:281–6.
- Brown LD, Cai TT, DasGupta A. Interval estimation for a binomial proportion. *Stat Sci* 2001;16:101–17.
- Hajian-Tilaki K. Receiver operating characteristic (ROC) curve analysis for medical diagnostic test evaluation. *Caspian J Intern Med* 2013;4:627–35.
- Bauer GR. Incorporating intersectionality theory into population health research methodology: challenges and the potential to advance health equity. *Soc Sci Med* 2014;110:10–17.
- Macgregor C, Blane DN, Pravinkumar SJ, Booth G. Chronic pain and health inequalities: why we need to act. *Scand J Pain* 2023;23:225–7.
- Macgregor C, Walumbe J, Tulle E, Seenan C, Blane DN. Intersectionality as a theoretical framework for researching health inequities in chronic pain. *Br J Pain* 2023. <https://doi.org/10.1177/20494637231188583>.
- Hart JT. The inverse care law. *Lancet* 1971;1:405–12.
- Brady B, Veljanova I, Chipchase L. An exploration of the experience of pain among culturally diverse migrant communities. *Rheumatol Adv Pract* 2017;1:rxx002:20170630.

30. Stormacq C, Van den Broucke S, Wosinski J. Does health literacy mediate the relationship between socioeconomic status and health disparities? Integrative review. *Health Promot Int* 2019;34:e1–17.
31. van Doorslaer E, Masseria C, Koolman X, OECD Health Equity Research Group. Inequalities in access to medical care by income in developed countries. *CMAJ (Can Med Assoc J)* 2006;174:177–83.
32. Craig KD, Holmes C, Hudspith M, Moor G, Moosa-Mitha M, Varcoe C, et al. Pain in persons who are marginalized by social conditions. *Pain* 2020;161:261–5.

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**Supplementary Material:** This article contains supplementary material (<https://doi.org/10.1515/sjpain-2026-0004>).