Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Occupational class trends in diagnosis-specific sickness absence among natives and migrants: a population-based register study

Waseem Haider
wahaid@utu.fi
University of Turku
Laura Salonen
Finnish Institute of Occupational Health

Article

Keywords:

Posted Date: April 20th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8950867/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Sickness absence (SA) reflects both health status and labour-market integration, yet evidence on migrant–native disparities across occupational classes remains limited. Using full-population Finnish administrative registers, we examined SA prevalence among working-age migrants and natives from 2005 to 2019, stratified by occupational class and diagnostic category. Age-adjusted prevalence and relative risks were estimated for all-cause SA and for musculoskeletal, mental disorder–related, and injury-related SA using modified Poisson regression adjusted for sociodemographic factors. SA declined during the study period, except among lower non-manual workers. Across occupational classes and diagnostic groups, migrants consistently exhibited lower SA prevalence than natives. Both populations showed clear occupational gradients, with manual workers, lower non-manual employees, and the unemployed experiencing the highest SA risks. Occupational disparities widened over time, particularly among migrant men. Among unemployed migrant men, the relative risk of all-cause SA increased over the study period. Occupational disparities were generally more pronounced among men than women. Occupational class remains a key factor influencing SA among both natives and migrants in Finland, with significant differences based on diagnostic groups and gender. Although migrants generally had lower overall SA rates than natives, they had higher relative risks of SA, especially among the unemployed and manual workers.

INTRODUCTION

European societies are becoming increasingly diverse [1], making the health and work integration of migrants a pressing public health issue. In Finland, as of 2024, over 10% of the population was foreign-born, and net immigration has been the primary driver of recent population growth, adding more than 32,000 persons in 2024 alone [2]. Understanding how well migrant workers remain healthy and engaged in their work is therefore an urgent public health and labour-market priority. One way to analyze this is to look at sickness absence (SA). SA serves as an indicator of health and work participation affecting about 9–10% of the working-age population each year [3]. SA incurs high costs for employers, employees, and their families, as well as for society, in terms of lost productivity, income, and social security costs [4,5].

Previous Nordic full-population register-based studies have consistently shown migrant–native gaps in SA rates [6,7]. Swedish data 1982–1991 revealed higher utilization of sickness benefits among virtually all foreign-born groups compared with natives after adjustment for age and gender [8]. Norwegian panel studies covering the periods 1992–2003 and 2000–2011 also reported an increased risk of SA for migrants, especially those from non-Western countries, even after controlling for an extensive set of covariates [6,7]. Complementing these findings, Nilsson's[9] Swedish study, which utilized linked microdata from 1971 to 1991, demonstrated that ethnic differentials persisted when workplace factors and incentives were modeled simultaneously. Together, the evidence indicates that migrant status remains a salient predictor of SA across Nordic welfare states. However, a recent study in Finland found lower SA rates in 2011–2013 and 2014–2016 among non-EU migrant healthcare workers [10]. In general, studies on migrants' use of SA in Finland are scarce. We aim to contribute to the literature by examining SA among all migrants in Finland and by considering the region of origin, as migrants are a heterogeneous population, and differences in migration background and labour market integration may influence SA patterns differently.

One plausible explanation for higher SA rates among migrants is occupational sorting. Migrants are disproportionately employed in lower occupational classes and in physically demanding jobs, both of which are well-established risk factors for SA [2,11,12]. Occupational class differences in SA are largely driven by differences in working conditions, particularly physical workload, and these inequalities are especially pronounced for musculoskeletal diagnoses [12,13]. In the European and Nordic context, migrants, particularly those from non-Western countries, are more often concentrated in low-skilled occupations characterized by greater physical strain [11,14,15]. If physically demanding work increases the risk of SA, the overrepresentation of migrants in such occupations may partly explain higher SA rates among certain migrant groups. In addition to occupational class, migrants are more likely to experience insecure employment [16] and lower wages [17]. These factors are associated with poorer health outcomes, which may translate into higher SA. However, employment insecurity may also discourage absence due to fear of income loss or job loss, potentially leading to lower observed SA rates.

Previous studies have aimed to adjust for workplace by controlling for the industrial sector [6,7], showing that it only modestly explains the migrant-native gap in SA. However, industrial sector only captures part of the important work-related factors. It does not account for within-industry heterogeneity, i.e., workers occupy very different positions in the employment hierarchy, ranging from managerial and professional roles to routine and manual jobs (e.g., nursing assistants and medical doctors employed in the same industrial sector) [18–20]. This is especially relevant when analyzing migrants, who are more

often working in lower positions. By contrast, occupational classes represent vertical labour-market stratification (e.g., authority, employment relations, contract security, and task content) [21,22]. Therefore, it more directly illustrates the mechanisms that create SA inequalities, including differences in workers' educational qualifications, exposure to physical and psychosocial demands, autonomy, and replaceability. As a result, industrial sector-based adjustment may mask substantial within-sector stratification and underestimate the contribution of occupational disparities to migrant–native differences in SA. Evidence from Finland supports this interpretation. In a register-based study of healthcare workers, Olakivi et al.[10] demonstrated that adjusting for occupational position, region, and income altered migrant–native differences in SA rates. In particular, after controlling for occupation, the initially lower SA rates observed among care workers from post-2004 EU countries were attenuated and no longer clearly differed from those of Finnish-born workers, whereas workers from Western Europe and the Global North exhibited higher SA rates than Finnish-born workers in both models. These findings suggest that occupational positioning can meaningfully reshape observed migrant–native differences in SA, reinforcing the importance of examining full-population differences by occupational class rather than relying solely on industrial sector. The findings also highlight the importance of the region of origin when analyzing SA among migrants.

When examining SA among occupational classes, it is important to consider the diagnostic group for two main reasons. First, as mentioned above, the occupational disparities are wider in SAs due to musculoskeletal diseases than in any other diagnostic group [23,24]. Second, musculoskeletal disorders have historically been the main cause of SA among manual workers, but after 2018, mental disorders became the most common cause of SA [25]. The prevalence of SA due to mental disorders has grown rapidly, especially among lower non-manual employees [26]. Whether these diagnostic- and occupational class-specific trends similarly characterize SA patterns among migrants remains largely unknown. Lastly, as the prevalence of SA is more common among women than men [24], it is important to control for gender in the analyses.

To address the above-discussed knowledge gaps, our study used Finland's administrative registers to answer the following two research questions: 1) How have SA patterns evolved over time among migrants and natives and do these trends differ between the two groups by gender? and 2) To what extent do migrant-native differences in SA, and region of origin vary across diagnosis and occupational class?

DATA AND METHODS

We obtained pseudonymized, individual-level, full-population data for individuals aged 25 to 64 from 2005 to 2019 from the registers of Statistics Finland and the Social Insurance Institute of Finland (SIIF). The information on sociodemographic variables and migrant-related variables was obtained from Statistics Finland, and on diagnosis-specific SA from SIIF.

Study population

The study population was defined annually and included individuals aged 25–64 based on year-end data from 2005 to 2019. We restricted the lower age to 25 years because, before that age, most individuals do not have an established occupation class, and the upper age to 64 because, beyond this age, most individuals retire from the labour market. The annual number of individuals in the final study population ranged from 2.33 to 2.36 million.

Measurement of SA

We used the yearly prevalence of SA as the outcome variable. Prevalence measures, which include both new and ongoing spells within a defined period, are considered theoretically and epidemiologically relevant indicators in SA research [27]. We retrieved data on SA spells for the years 2005 to 2019, recording the start and end dates and the physician-certified primary diagnosis for each episode. Diagnoses were extracted from the International Classification of Diseases, 10th Revision (ICD-10), recorded at the spell level [28]. We used the initial medical reason for work incapacity, as diagnostic changes are relatively uncommon at the ICD-10 Chapter level [29]. We examined all diagnoses collectively (all-cause) and also separately for the three primary diagnostic groups responsible for SA in Finland: mental and behavioural disorders (F00-F99), musculoskeletal diseases (M00-M99), and injuries (S00-T98). We selected these three groups for separate diagnostic-specific analysis because they collectively accounted for 65% of all SA spells from 2005 to 2019. We used the yearly prevalence of SA as the outcome variable.

In Finland, the SIIF pays a sickness allowance when a physician certifies that illness or injury has reduced an individual's work capacity by more than ten working days. Because the initial waiting period excludes Sundays and mid-week public holidays, this corresponds to at least 12 consecutive days of absence. For employees, the employer covers the ten-day

waiting period through statutory sick pay [30]. Self-employed persons may apply for the sickness allowance for self-employed persons and entrepreneurs insured under the Self-Employed Persons' Pensions Act [31], to cover their income losses during the waiting period of the standard sickness allowance. SIIF can continue paying the allowance for up to roughly one year.

Measurement of sociodemographic variables

Our study incorporated time-varying information on individuals' occupational class, age, sex, marital status, and region of residence. Regarding occupational class, we used Statistics Finland's classification [32]. This classification is based on the main economic activity at the end of a calendar year. We divided it into five groups: upper non-manual employees, lower non-manual employees, manual workers, self-employed, and unemployed. We excluded students, conscripts, and others outside the labour market from the analysis. We used age in 5-year bands for age standardization and divided it into four categories: 25–34, 35–44, 45–55, and 56–64, for the regression models. Sex was categorised into men and women. Marital status was categorised into single, married, and divorced/widowed. We included cohabiting partners in the married category. The region of residence was classified into five categories: the Capital Region, South, West, East, and North Finland. The Åland Islands were part of the West category of region of residence.

Migrant-specific variables

Migrant

In this study, the term "migrant" refers to individuals born abroad who now reside in Finland. We obtained information on migration status from Statistics Finland's migration register. We used migrant as a binary variable, with 0 categories for natives and 1 for migrants.

Region of origin

We adopted a classification method for migrants consistent with previous studies conducted in Finland [33,34]. All European countries, including the United Kingdom, Switzerland, Iceland, and Norway, and Western countries, including the USA, Canada, Australia, and New Zealand, were categorized as "European and Western countries." Russia and the former Soviet Union republics were grouped as "Russia/Former Soviet Union", except for Estonia, which was included in the "European and Western countries" category. All countries on the Asian continent were grouped as "Asian countries" except those where one-third of all recent migrants emigrated for humanitarian reasons, which were added to the "refugee-origin" category. Countries from around the globe, where one-third of all recent migrants emigrated for humanitarian reasons, were placed in the "refugee-origin" country group. Finally, all remaining countries, including the majority of Africa, were combined into the "other" category.

Distributions of the variables are shown in Table 1, separately for migrants and natives for the years 2005, 2012, and 2019.

Statistical analysis

We calculated age-standardized prevalence of SA through direct standardization based on the pooled age distribution of person-years in 5-year age bands. For each combination of migrant status, gender, and calendar year, we derived age-specific prevalence using binomial variance. The age-standardized estimates were obtained by applying standard age weights to these age-specific estimates and summing across the age groups. The variances of these weighted estimates were computed as the sum of squared weights multiplied by the age-specific variances, and 95% confidence intervals were determined using the normal approximation.

To quantify adjusted disparities in SA outcomes across occupational classes within each diagnostic group, by migrant status and gender, at the beginning (2005), middle (2012), and end (2019) of the observation period, we fit generalized linear models. In line with Blomgren and Perhoniemi's [24] approach, we used Modified Poisson regression models with the Poisson distribution and a log link function, and robust standard errors [35,36], to estimate relative risks (RRs) in the annual SA prevalence across occupational classes by migrant status and gender. The results were reported as risk ratios (RR) with 95% CIs. All models were adjusted for age, gender (excluding gender-specific models), marital status, and region of residence; for migrant-specific models, we additionally adjusted for length of stay. We used interaction models to examine variations in SA by occupational class and migration-related factors across different diagnostic groups (all-cause, musculoskeletal, mental disorder, and injury). Two-way interactions between occupational class and migrant status, as well as between occupational class and region of origin, were included in the models. Temporal differences were analyzed through three-way interactions

involving occupational class, migrant status, and time (2005, 2012, and 2019), and also between occupational class, region of origin, and time. Results were summarized using average marginal effects to facilitate interpretation across the models and outcomes. We conducted sensitivity analysis by replicating the models by region of origin. In addition, to account for potential excess zeros in SA, we estimated zero-inflated Poisson regression models to account for excess zeros in SA. The results were substantively similar to those obtained from the modified Poisson regression models, indicating the robustness of our findings to model specification. We conducted the analyses in Stata MP18 and the visualization in R.

RESULTS

SA prevalence trends

In 2005, 12.0% of the study population had SA, with a higher prevalence among natives (12.2%) compared with migrants (6.4%). SA prevalence decreased over time, falling to 10.6% by 2019. At the end of the follow-up, the prevalence remained higher among natives (11.1%) than among migrants (6.3%) (Table 1). At the same time, the number of migrants increased rapidly, whereas the number of native-born slightly decreased. The prevalence of SA was higher among older age groups, women, divorced, lower non-manual employees, those living in the Northern region among natives and in the Western region among migrants, and among migrants with longer length of stay. Among migrants, SA prevalence varied by region of origin, with the highest rates among those from European & Western countries (8.0%), followed by migrants from ‘other’ countries (7.9%), Russia/Former Soviet Union (7.1%), refugee-origin countries (6.7%), and Asian countries (4.3%).

Table 1
Distributions of the characteristics of the study population for selected baseline years.

	Native		Migrants		Native		Migrants		Native		Migrants	
	2005				*2012*				*2019*			
	N	%	N	%	N	%	N	%	N	%	N	%
Occupational class												
Upper non-manual employees	450,177	20	13,060	18	460,648	21	19,630	15	514,509	24	32,924	16
Lower non-manual employees	713,285	31	12,156	17	757,287	34	24,455	18	725,173	34	38,411	19
Manual workers	630,084	28	22,597	31	543,444	24	48,903	36	505,004	23	77,101	37
Self-employed	232,582	10	6,475	9	235,426	11	12,903	9	218,191	10	21,256	10
Unemployed	239,134	11	17,969	25	222,342	10	29,695	22	192,077	9	37,566	18
Gender												
Men	1,142,537	50	36,756	51	1,114,164	50	70,094	52	1,084,525	50	109,471	53
Women	1,122,725	50	35,501	49	1,104,983	50	65,492	48	1,070,429	50	97,787	47
Age group												
25–34	531,443	24	23,295	32	537,313	24	48,213	35	523,117	24	68,302	33
35–44	636,343	28	24,775	34	553,460	25	41,588	31	565,332	26	67,587	32
45–54	664,908	29	16,668	23	633,557	29	30,583	23	555,315	26	45,246	22
55–64	432,568	19	7,519	11	494,817	22	15,202	11	511,190	24	26,123	13
Marital status												
Single	385,144	17	7,849	11	402,007	18	25,224	19	450,637	21	43,478	21
Married/Cohabiting	1,657,209	73	54,921	76	1,605,214	72	94,911	70	1,500,146	70	140,615	68
Divorced/widowed	222,909	10	9,487	13	211,926	10	15,451	11	204,171	9	23,165	11
Region of residence												
The capital region	664,387	29	38,905	54	660,932	29	73,928	55	672,894	31	119,870	58
South	293,549	13	7,596	11	278,462	13	14,211	10	254,477	12	17,849	8
West	803,448	35	18,328	25	790,376	35	34,723	25	763,084	35	51,098	25
East	236,053	11	3,705	5	224,218	10	6,615	5	207,779	10	8,944	4
North	267,825	12	3,723	5	265,159	12	6,109	5	256,720	12	9,497	5
Region of origin												
European & Western countries			18,910	26			42,988	32			65,642	32
Russia/Former Soviet Union			19,716	27			32,975	24			41,822	20
Asian countries			9,102	13			21,424	16			39,769	19
Refugee-origin countries			6,100	8			13,075	10			27,015	13
Other countries			18,429	26			25,124	18			33,010	16
Length of stay (years)												
Below 7			28,343	39			58,404	43			70,817	34
7–12			18,845	26			27,917	21			54,701	26

	Native		Migrants		Native		Migrants		Native		Migrants	
	2005				*2012*				*2019*			
13–18			15,673	22			18,821	14			30,210	15
Over 18			9,396	13			30,444	22			51,530	25
Diagnostic group												
Musculoskeletal diseases	98,792	33	1,399	28	90,483	34	3,087	33	69,270	28	4,498	32
Mental disorders	46,051	15	907	18	39,817	15	1,313	14	58,943	23	2,669	19
Injuries	42,461	14	640	13	42,320	16	1,422	16	35,693	14	2,024	14
Other diagnoses	112,528	38	2,000	41	95,435	35	3,440	37	87,991	35	4,965	35
Total	2,265,262		72,257		2,219,147		135,586		2,154,954		207,258	
	2,337,519				2,354,733				2,362,212			

In general, the prevalence of all-cause SA was the highest in manual workers and the lowest among upper non-manual employees (Fig. 1). There were some differences in the (all-cause) SA trends by occupational classes between migrants and natives. The prevalence of SA increased among non-manual employees, decreased among manual workers and the unemployed, and remained relatively stable among self-employed natives (Table 1 & Fig. 1). In migrants, the prevalence of SA increased among lower non-manual employees and manual workers, decreased in upper non-manual employees and the unemployed, and remained stable among the self-employed.

Diagnosis-specific trends in Fig. 1 showed that SAs due to musculoskeletal diseases and injuries decreased in all occupational classes except among the unemployed, among both migrants and natives, but the trends were very different for mental disorders. Among natives, the prevalence of SA due to mental disorders was highest among the unemployed. Among migrants, it was the highest among lower non-manual employees, except for the latest years, when the unemployed surpassed it. The most notable increase in SA prevalence was observed after 2016 among the unemployed, especially in SAs due to mental disorders (Fig. 1). Likewise, the prevalence of SA due to mental disorders, among upper non-manual employees, showed a relatively steep increase, and this group reached the level of manual workers.

SA prevalence trends by gender

A key gender-specific pattern was that women consistently exhibited higher SA prevalence than men, and the occupational ordering of SA prevalence differed between genders (Fig. 2). Among women, lower non-manual employees stood out as a high-prevalence group, exhibiting the second-highest all-cause SA after manual workers, whereas among men, SA was more clearly the highest among manual workers. This pattern was observed among both natives and migrants. Among migrants, the pattern was also seen in SAs due to musculoskeletal diseases.

A further gendered difference concerned mental disorder–related SA. Among native women, SA due to mental disorders increased markedly over time across occupational classes, with particularly strong increases among the unemployed and a notable rise also among lower non-manual employees. By contrast, migrant women did not exhibit a similarly strong increase in mental disorder–related SA, with prevalence remaining relatively stable across most occupational classes during the follow-up. Only unemployed migrant women showed a late-period increase. Among men, similar trends were observed. As an exception, among migrant men, the increase in SA due to mental disorders was stronger than among migrant women

Relative differences in SA prevalence by occupational class, migrant status and gender

In general, occupational disparities increased over time among both natives and migrants. Compared to upper non-manual employees, the relative risk (RR) for all-cause SA among other occupational classes increased during the follow-up, except for manual workers among natives, whose RR decreased over the years.

Occupational disparities increased more strongly among migrants than among natives. The most notable rise in the RRs was seen among the unemployed. Among natives, the relative risk (RR) rose from 1.10 (95% CI 1.09–1.12) in 2005 to 1.65 (95% CI 1.62–1.67) among the unemployed, compared to upper non-manual employees. Among unemployed migrants, RRs

increased from 1.15 (95% CI 1.04–1.26) in 2005 to 1.94 (95% CI 1.81–2.08) in 2019 (Table 2). Interestingly, migrants who were self-employed had a lower RR than upper non-manual employees in 2005, but since 2012, the risk has reversed.

Gender-stratified results indicated that occupational inequalities were more pronounced among men than women, particularly among migrants (Table 2). Among men, native manual workers had persistently elevated all-cause SA risk that declined slightly over time (RR 2.35 [95% CI 2.31–2.39] in 2005 to 2.20 [2.16–2.25] in 2019), whereas among migrant manual workers the risk increased modestly (RR 2.15 [1.89–2.44] to 2.32 [2.11–2.54]). The largest increases occurred among the unemployed: for native men, RR rose from 1.35 [1.32–1.38] in 2005 to 2.07 [2.02–2.13] in 2019, while for migrant men it increased from 1.33 [1.15–1.54] to 2.56 [2.32–2.83]. By 2019, unemployed migrant men emerged as the highest-risk group across multiple outcomes, including musculoskeletal SA (RR 4.45 [3.53–5.61]) and mental disorder–related SA (RR 2.60 [2.13–3.18]). Self-employment also differed by migrant status among men: native self-employed men had higher risk than upper non-manual employees throughout (RR 1.24 [1.21–1.27] in 2005; 1.51 [1.47–1.54] in 2019), whereas migrant self-employed men started with a lower risk (RR 0.81 [0.66–0.99] in 2005) that later reversed (RR 1.41 [1.26–1.59] in 2019).

Table 2
Adjusted* relative risks (RR with 95% confidence intervals (CI)) for the yearly all-cause SA in 2005, 2012, and 2019 by occupational class, migrant status, and gender.

	Natives			Migrants		
	2005	*2012*	*2019*	*2005*	*2012*	*2019*
	RR (95% CIs)	RR (95% CIs)	RR (95% CIs)	RR (95% CIs)	RR (95% CIs)	RR (95% CIs)
All						
Upper non-manual employees	–	–	–	–	–	–
Lower non-manual employees	1.65 (1.63–1.67)	1.73 (1.71–1.75)	1.76 (1.74–1.78)	1.61 (1.46–1.77)	1.86 (1.72–2.02)	2.05 (1.92–2.19)
Manual workers	1.94 (1.92–1.96)	1.91 (1.89–1.94)	1.70 (1.68–1.72)	1.96 (1.79–2.14)	2.09 (1.94–2.24)	2.02 (1.90–2.15)
Self-employed	1.02 (1.00–1.04)	1.18 (1.17–1.20)	1.21 (1.19–1.23)	0.81 (0.70–0.93)	1.12 (1.01–1.24)	1.16 (1.07–1.27)
Unemployed	1.10 (1.09–1.12)	1.25 (1.23–1.27)	1.65 (1.62–1.67)	1.15 1.04–1.26	1.20 (1.11–1.31)	1.94 (1.81–2.08)
Men						
Upper non-manual employees	–	–	–	–	–	–
Lower non-manual employees	1.57 (1.54–1.60)	1.61 (1.57–1.64)	1.67 (1.64–1.71)	1.23 (1.03–1.47)	1.66 (1.43–1.91)	1.78 (1.59–2.00)
Manual workers	2.35 (2.31–2.39)	2.30 (2.26–2.35)	2.20 (2.16–2.25)	2.15 (1.89–2.44)	2.52 (2.25–2.83)	2.32 (2.11–2.54)
Self-employed	1.24 (1.21–1.27)	1.45 (1.41–1.48)	1.51 (1.47–1.54)	0.81 (0.66–0.99)	1.45 (1.25–1.68)	1.41 (1.26–1.59)
Unemployed	1.35 (1.32–1.38)	1.47 (1.44–1.51)	2.07 (2.02–2.13)	1.33 (1.15–1.54)	1.71 (1.50–1.94)	2.56 (2.32–2.83)
Women						
Upper non-manual employees	–	–	–	–	–	–
Lower non-manual employees	1.46 (1.44–1.48)	1.56 (1.54–1.59)	1.56 (1.54–1.58)	1.56 (1.38–1.77)	1.63 (1.48–1.80)	1.85 (1.70–2.01)
Manual workers	1.80 (1.77–1.82)	1.87 (1.84–1.90)	1.65 (1.62–1.68)	1.83 (1.62–2.06)	1.86 (1.69–2.05)	1.85 (1.70–2.01)
Self-employed	0.93 (0.91–0.95)	1.10 (1.07–1.13)	1.18 (1.15–1.20)	0.86 (0.71–1.04)	0.93 (0.81–1.08)	1.01 (0.89–1.14)
Unemployed	0.95 (0.93–0.97)	1.17 (1.14–1.19)	1.51 (1.48–1.54)	1.00 (0.87–1.14)	0.91 (0.81–1.01)	1.53 (1.40–1.67)

*Adjusted for age, gender (excluding gender-specific models), marital status, region of residence and length of stay (for migrants only).

Among women, occupational inequalities were present but generally smaller. Among natives, manual workers had the highest risk of SA, whereas among migrants, manual workers and lower non-manual employees had similarly elevated all-cause risk by 2019 (RR 1.85 [1.70–2.01] for both). Unemployed native women showed a notable rise in all-cause SA over time, from RR 0.95 (95% CI 0.93-097) to 1.51 (1.48–1.54) between years 2005 and 2019. The RRs among migrants rose from

1.00 (0.87–1.14) to 1.53 (1.40–1.67) respectively. Unlike men, in migrant women the risk of SA did not differ between self-employed and upper non-manual employees during any year).

Diagnosis-specific patterns showed marked heterogeneity. Musculoskeletal-related SA displayed the strongest occupational disparities (Table S1). In 2019, manual workers had RR 3.59 (95% CI 3.49–3.69) in natives and 4.29 (95% CI 3.71–4.96) in migrants, and lower non-manual employees also had elevated risks, especially among migrants (RR 3.36 [95% CI 2.88–3.91]) compared to upper non-manual workers. For SA due to mental disorders, the occupational pattern was different (Table S2), with the unemployed consistently showing the highest risks and clear increases over time (natives: RR 1.34 [95% CI 1.29–1.38] in 2005 to 2.03 [95% CI 1.97–2.09] in 2019; migrants: 1.39 [95% CI 1.12–1.71] in 2005 to 1.96 [95% CI 1.73–2.23] in 2019). Manual workers and the self-employed frequently showed smaller risks of SA than upper non-manual employees, particularly among natives. Injury-related SA showed smaller but persistent occupational differences (Table S3), with manual workers having the highest in 2019 (natives: RR 2.18 [95% CI 2.11–2.25]; migrants: 2.45 [95% CI 2.06–2.90]).

Lastly, we run an interaction model between occupational class, migrant status and time, and reported average marginal effects (AMEs). The results complemented the RR analyses by indicating that, within occupational classes, migrant–native differences in SA were generally modest (Figures S5–S6). Across most occupational classes and diagnostic groups, migrants exhibited lower all-cause AMEs than natives. The principal exception was the unemployed, among whom migrants showed slightly higher AMEs for all-cause and musculoskeletal SAs but lower in mental disorder– and injury-related SAs compared with natives. Over time, AMEs suggested broadly similar absolute changes in SA within occupational classes for migrants and natives, with the unemployed representing the most notable deviation (Fig. 4). In contrast, the RR analyses revealed clearer differential changes by migrant status, underscoring that relative inequalities evolved more strongly than absolute differences.

Sensitivity analysis by Region of origin

Sensitivity analyses stratified by region of origin corroborated the main findings and showed that differences observed across prevalence estimates, relative risks, and AMEs reflected the same underlying patterns of occupational stratification in SAs (Figures S1–S4, S6, Tables S5–S7). Across regions of origin and diagnostic groups, occupational inequalities in SA were broadly similar in direction to those observed in the main analyses but tended to be narrower among migrants than among natives, often accompanied by wider confidence intervals, particularly among migrants from Asian and refugee-origin countries, indicating greater statistical uncertainty (Figures S1–S4).

Among migrants from Russia/former Soviet Union, unemployed individuals consistently exhibited lower SA prevalence and lower risks of all-cause and musculoskeletal-related SA than unemployed natives, with only modest changes over time. This pattern was evident across prevalence estimates (Figure S1), RR models (Table S4), and AME-based interaction analyses (Figures S6).

Beyond this exception, differences by region of origin were limited and did not materially affect the study's main findings. Musculoskeletal disorders remained the main cause of occupational disparities across regions of origin (Figure S2), mental disorder–related SA showed weaker and less consistent occupational differences (Figure S3), and injury-related SA remained low with mostly overlapping CIs (Figure S4). Overall, the sensitivity analyses support the robustness of the main findings and indicate that heterogeneity by region of origin does not substantially modify the observed patterns of occupational and diagnostic disparities in SA.

DISCUSSION & CONCLUSION

Our full-population register-based study provides a comprehensive investigation of migrant–native differences in SA prevalence across occupational classes and diagnostic groups in Finland over a 15-year period. Three core findings emerged from the analysis. First, migrants consistently exhibited lower SA prevalence than natives across the study period. Second, clear and persistent occupational disparities in SA were observed in both populations. Third, although SA prevalence declined over time, this aggregate trend concealed divergent developments across occupations, particularly a late period increase among the unemployed individuals.

This study shows that migrants in Finland had consistently lower SA prevalence than natives across diagnostic categories and throughout the study period. In Finland’s relatively restrictive labour market compared to other Nordic countries, limited opportunities to stay employed while working at reduced capacity may reinforce health-based selection into employment [37]. For migrants in particular, access to stable employment may require sustained work capacity and flexibility, resulting in a positively selected group among those who remain employed [38,39]. Lower observed SA among migrants may

therefore partly reflect stronger selection processes rather than lower underlying health needs. In addition, migrants may face higher barriers to accessing healthcare and occupational health services, as well as informational and administrative challenges in navigating sickness insurance systems [11,40]. These barriers are consistent with an interpretation in which lower SA use among migrants reflects limited access to and utilization of SA rather than better health [41,42].

This finding contrasts with earlier Nordic register-based studies from Sweden and Norway, which reported higher SA among migrants than natives [6–8]. In those contexts, the migrant excess was commonly linked to concentration in physically demanding jobs, labour-market disadvantage, and cumulative socioeconomic and health vulnerabilities not fully captured by adjustment for the industrial sector. More recent Finnish evidence, however, suggests lower SA among migrants and highlights mechanisms such as the healthy immigrant effect, job insecurity and presenteeism, occupational downgrading, service system illiteracy, discrimination, and selective recruitment favoring individuals with strong work capacity [10]. These differing findings between Nordic countries probably reflect variations in migrant composition and institutional settings [43]. Finland has experienced relatively recent, smaller-scale immigration compared with Sweden or Norway, and its foreign-born population remains relatively small [44]. A more recent immigration pattern may suggest stronger positive health and employment selection, which could enhance the healthy immigrant effect. Meanwhile, employment rates among foreign-born individuals in Finland remained lower than in several other Nordic countries [44], possibly indicating greater challenges in securing stable employment and thus stronger selection among employed migrants. The differences in migrant SA patterns across countries appear to result from the interplay among migration history, labour-market integration, and institutional policies, rather than from migrant status alone.

SA prevalence decreased at the population level during the study period. As an exception, a late-period increase was observed in mental disorder–related SA. Similar patterns have been observed in the Finnish general population, where rising mental disorder–related SA, especially among unemployed individuals [24]. This increase has been attributed to increasing mental health problems, shifts in diagnostic practices, and improved recognition of mental disorders within sickness insurance systems [24,26]. Previous evidence further indicates that the increase among the unemployed is especially marked for certain mental diagnoses and varies by gender, underscoring that the increase is not uniform across groups [45]. Importantly, unemployment in the present study reflected the main activity during the calendar year rather than employment status at the onset of SA. Consequently, the rise in SA among the unemployed may partly reflect individuals who experienced SA while employed and subsequently exited the labour market, indicating processes of health-related labour-market exclusion rather than increased SA uptake among those already outside employment.

Occupational class strongly structured SA patterns among both migrants and natives. Manual and lower non-manual workers consistently showed higher SA prevalence and risk than upper non-manual workers, particularly for musculoskeletal disorders, whereas upper non-manual workers exhibited the lowest and most stable levels, consistent with previous findings from population-level studies [24,26]. The overall shape of the occupational gradient was similar in both populations, indicating that occupational stratification structures SA in comparable directions among migrants and natives. However, the magnitude of these differences varied. Relative occupational disparities were, in several instances, steeper among migrants, particularly among unemployed men, whereas absolute differences were generally smaller among migrants than among natives, except in certain unemployed groups. Thus, while occupational class is a key determinant of SA in both populations, its quantitative impact varies by migrant status. These patterns are consistent with earlier Nordic findings that adjusting for work characteristics explains only a modest share of migrant–native differences in SA [6,7]. Moreover, unlike prior work that relies primarily on the industrial sector as a proxy for working conditions, our use of occupational class captures vertical stratification within sectors, encompassing differences in educational requirements, physical workload, job control, and employment security. The clearest divergence emerged among unemployed men, where migrant men showed particularly strong increases in SA risk, which may reflect compositional change within the unemployed migrant population over time [46], including growing heterogeneity in health status, cumulative labour-market disadvantage, and differential access to healthcare and occupational health services prior to labour-market exit.

Gender differences in SA were pronounced and consistent with the existing research [24,26]. Women exhibited higher SA prevalence than men in both migrant and native populations, and occupational gradients were steeper among women, particularly for musculoskeletal and mental disorder–related SA [24,26]. Among migrants, however, gender differences in SA prevalence were smaller. This pattern likely reflects gendered differences in labour-market attachment. Employment rates among migrant women are substantially lower than among migrant men [47], meaning that a large share of migrant women are not exposed to the risk of SA. Those migrant women who are employed may therefore represent a more health-selectively sampled group. Migrant women outside employment may rely more on alternative benefits or face greater

barriers to healthcare access, contributing to lower observed SA prevalence despite potential health needs. These dynamics may also help explain why increases in mental disorder–related SA were less pronounced among migrant women than among native women.

The findings indicate that migrants' lower overall SA prevalence coexists with their concentration in disadvantaged occupational classes. This pattern is consistent with an unmet-need interpretation, whereby migrants may delay care-seeking or avoid SA until health problems become severe enough to necessitate absence. Lower SA among migrants should therefore not be interpreted as evidence of better health. From a policy perspective, the results highlight the need to strengthen primary prevention in physically demanding jobs, especially for musculoskeletal disorders, and ensure equitable access to occupational and mental health services for both employed and unemployed individuals. Improving early identification of work ability problems within employment may help prevent transitions from SA into unemployment. Future research should investigate employment trajectories before and after SA and examine how institutional reforms, healthcare practices, and labour-market dynamics interact with migrant status to influence long-term work participation. Combining register-based analyses with qualitative data would provide a deeper understanding of the mechanisms underlying low overall SA and higher risks in specific migrant subgroups.

Strengths and Limitations of this Study

This study has several significant strengths. It is based on nationwide register data covering all natives and migrants aged 25–64 residing in Finland between 2005 and 2019, including both employed and unemployed individuals, which minimizes selection bias and ensures full population coverage. The use of complete, physician-certified SA records with precise start and end dates improves the accuracy and reliability of the outcome measurement. The administrative nature of the data removes self-report bias, decreases the risk of self-selection, and results in virtually no loss to follow-up. However, some limitations should be acknowledged. The registers do not record short SA spells of fewer than ten working days, which may underestimate SA and could affect observed occupational disparities. Additionally, we lacked detailed information on specific working conditions and health-related behaviors, which might partly explain occupational and migrant–native disparities in SA prevalence.

Declarations

Ethics approval and consent to participate

This study was performed in line with the principles of the Declaration of Helsinki. This study was based on secondary data collected for administrative and statistical purposes. The study complies with the national legal framework governing access to pseudonymized personal data for scientific research conducted in the public interest. The informed consent was waived by the ethics committee of Statistics Finland Ethical (permission to access these data for this research purpose # TK/3279/07.03.00/2022); the legal basis is stated in the Finnish Personal Data Act (523/1999), Finnish Statistics Act (280/2004), and the EU General Data Protection Regulation (Art. 9 of the GDPR). Since the data were derived from registers, ethical approval was not necessary under Finnish Law.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

Funding

This research has been supported by the INVEST Research Flagship Center, funded by the Academy of Finland Flagship Programme [grant number: 345546].

Author Contribution

**W.H. ** Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **L.S. ** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization.

Acknowledgement

We thank Professor Jani Erola and Professor Elina Kilpi-Jakonen for their technical and administrative support.

Data Availability

Due to data protection laws and regulations, the data of this study are unavailable from the corresponding author. However, they are available from the register data holders (Statistics Finland and Finnish Institute of Health and Welfare) upon reasonable request and subject to fees.

References

1. Rechel, B., Mladovsky, P., Ingleby, D., Mackenbach, J. P. & McKee, M. Migration and health in an increasingly diverse Europe. *Lancet* **381**, 1235–1245 (2013).
2. Kela. Information package: Sickness absence. *Social Insurance Institute of Finland* (2025). https://tietotarjotin.fi/en/information-package/2699253/information-package-sickness-absence
3. Henderson, M., Glozier, N. & Elliott, K. H. Long term sickness absence. *BMJ* **330**, 802–803 (2005).
4. OECD. Sickness, Disability and Work: Breaking the Barriers. Sickness, Disability and Work: Breaking the Barriers. (2010). 10.1787/9789264088856-EN
5. Dahl, S. Å., Hansen, H. T. & Olsen, K. M. Sickness absence among immigrants in Norway, 1992–2003. *Acta Sociol.* **53**, 35–52 (2010).
6. Hansen, H. T., Holmås, T. H., Islam, M. K. & Naz, G. Sickness Absence Among Immigrants in Norway: Does Occupational Disparity Matter? *Eur. Sociol. Rev.* **30**, 1–12 (2014).
7. Bengtsson, T. & Scott, K. Immigrant consumption of sickness benefits in Sweden, 1982–1991. *J. Socio-Economics*. **35**, 440–457 (2006).
8. Sterud, T. et al. A systematic review of working conditions and occupational health among immigrants in Europe and Canada. *BMC Public Health 2018 18:1* 18, 1–15 (2018).
9. Pekkala, J., Blomgren, J., Pietiläinen, O., Lahelma, E. & Rahkonen, O. Occupational class differences in diagnostic-specific sickness absence: a register-based study in the Finnish population, 2005–2014. *BMC Public. Health* **17**, (2017).
10. Statistics Finland. Every tenth employed person was of foreign origin in 2024. *Statistics Finland* (2024). https://stat.fi/en/publication/cm6uhzyb4edzf07uqd79p16ku
11. Pekkala, J., Blomgren, J., Pietiläinen, O., Lahelma, E. & Rahkonen, O. Occupational class differences in long sickness absence: a register-based study of 2.1 million Finnish women and men in 1996–2013. *BMJ Open.* **7**, e014325 (2017).
12. Timonen, V. New Risks-Are They Still New for the Nordic Welfare States? in New Risks, New Welfare: The Transformation of the European Welfare State (ed Taylor-Gooby, P.) 83–110 (Oxford University Press, Oxford, doi:10.1093/019926726X.003.0004. (2005).
13. Ugreninov, E. Absence Due to Sickness Among Female Immigrants: Disadvantages Over the Career? *J. Int. Migr. Integr.* **24**, 1455–1475 (2023).
14. Blomqvist, S., Högnäs, R. S., Farrants, K. & Friberg, E. Magnusson Hanson, L. L. Exploring the link between perceived job insecurity and sickness absence for common mental disorders. *Eur. J. Public. Health*. **35**, 650–656 (2025).
15. Piha, K., Laaksonen, M., Martikainen, P., Rahkonen, O. & Lahelma, E. Interrelationships between education, occupational class, income and sickness absence. *Eur. J. Public. Health*. **20**, 276–280 (2010).
16. Kauppinen, T., Uuksulainen, S., Saalo, A., Mäkinen, I. & Pukkala, E. Use of the Finnish Information System on Occupational Exposure (FINJEM) in epidemiologic, surveillance, and other applications. *Ann. Occup. Hyg.* **58**, 380–396 (2014).
17. Pukkala, E. et al. National job-exposure matrix in analyses of census-based estimates of occupational cancer risk. *Scand. J. Work Environ. Health*. **31**, 97–107 (2005).
18. Descatha, A., Fadel, M., Sembajwe, G., Peters, S. & Evanoff, B. A. Job-Exposure Matrix: A Useful Tool for Incorporating Workplace Exposure Data Into Population Health Research and Practice. *Frontiers epidemiology* **2**, (2022).
19. Erikson, R. & Goldthorpe, J. H. *The Constant Flux: A Study of Class Mobility in Industrial Societies* (Clarendon, 1992).
20. Rose, D. & Harrison, E. The European socio-economic classification: A new social class schema for comparative European research. *Eur. Soc.* **9**, 459–490 (2007).

21. Blomgren, J. & Perhoniemi, R. *Long-Term Sickness Absence in Finland: Trends by Sex, Age and Diagnostic Group from 2010–2023*. (2025). http://hdl.handle.net/10138/601614
22. Blomgren, J. & Perhoniemi, R. Occupational-class trends in diagnosis-specific sickness absence in Finland: a register-based observational study in 2011–2021. *BMJ Open.* **15**, e098001 (2025).
23. Blomgren, J. & Perhoniemi, R. Increase in sickness absence due to mental disorders in Finland: trends by gender, age and diagnostic group in 2005–2019. *Scand. J. Public. Health*. **50**, 318–322 (2022).
24. Perhoniemi, R. & Blomgren, J. Long-term sickness absences based on mental disorders by socioeconomic group – trends of prevalence in Finland 2010–2023. *BMC Public. Health*. **25**, 1277 (2025).
25. Hensing, G. The measurements of sickness absence – a theoretical perspective. *Norsk Epidemiologi*. **19**, 147–151 (2009).
26. World Health Organization. World Health Organization ICD-10In International Statistical Classification of Diseases and Related Health Problems, 10th Revision. WHO:Geneva, Switzerland. (2016).
27. Leijon, O., Österlund, N. & Josephson, M. How common is change of primary diagnosis during an episode of sickness benefit? A register study of medical sickness certificates issued 2010–2012 in Sweden. *Scand. J. Public. Health*. **43**, 44–51 (2015).
28. Toivonen, L. *Statutory and Accupational Sickness Benefits in Finland in 2011*. (2012). http://hdl.handle.net/10138/29614
29. Finlex *Self-Employed Persons's Pensions Act*. *Ministry of Justice* (2006).
30. Statistics Finland. Classification of Occupations 2010 | Statistics Finland. *Statistics Finland* (2010). https://stat.fi/en/luokitukset/ammatti/ammatti_1_20100101
31. Haider, W. & Salonen, L. Disability pension and sociodemographic & work-related risk factors among 2.3 million migrants and natives in Finland (2011–2019): a prospective population study. *BMC Public. Health*. **23**, 1–9 (2023).
32. Jauhiainen, S. & Raivonen, L. *Maahanmuuttajien Kelan Etuuksien Käyttö Vuonna 2018 (Use of Kela Benefits for Immigrants in*). (2018). http://urn.fi/URN:NBN:fi-fe2020120198868%0Ahttp://hdl.handle.net/10138/322299 (2020) doi:http://urn.fi/URN:NBN:fi-fe2020120198868%0Ahttp://hdl.handle.net/10138/322299
33. Schuring, M., Robroek, S. J. W., Otten, F. W. J., Arts, C. H. & Burdorf, A. The effect of ill health and socioeconomic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands. *Scand. J. Work Environ. Health*. **39**, 134–143 (2013).
34. Benach, J. et al. Precarious employment: understanding an emerging social determinant of health. *Annu. Rev. Public. Health*. **35**, 229–253 (2014).
35. Li, C. Y. & Sung, F. C. A review of the healthy worker effect in occupational epidemiology. *Occup. Med. (Lond)*. **49**, 225–229 (1999).
36. Keränen, S., Vaalavuo, M. & Kauppinen, T. *Onko Terveyden Ja Työllisyyden Yhteys Samanlainen Maahanmuuttaneilla Ja Suomalaisilla? Analyysi Erikoissairaanhoidon Palveluiden Käytöstä Ja Myöhemmästä Työmarkkina-Asemasta*. (2025). https://www.julkari.fi/handle/10024/152260
37. Çilenti, K. et al. Use of health services and unmet need among adults of Russian, Somali, and Kurdish origin in Finland. *Int. J. Environ. Res. Public. Health*. **18**, 1–22 (2021).
38. Kieseppä, V. et al. Immigrants' mental health service use compared to that of native Finns: a register study. *Soc. Psychiatry Psychiatr Epidemiol.* **55**, 487–496 (2020).
39. Birgier, D., Guðmundsdóttir, H. & Brynteson, M. *Labour Market Integration of Migrants' Descendants in the Nordic Countries | NVC*. (2025). https://nordicwelfare.org/integration-norden/en/publikationer/labour-market-integration-of-migrants-descendants-in-the-nordic-countries/
40. Nordic Statistics. Integration and migration. *Nordic Statistics database* (2026). https://www.nordicstatistics.org/areas/integration-and-migration/
41. Perhoniemi, R., blomgren & Luoto, R. Ahdistuneisuushäiriöt yleistyneet sairauspäivärahan perusteena –trenditarkastelu tarkemman diagnoosin mukaan 2010–2024. *Sos Laaketiet Aikak*. **63**, 256–261 (2026).
42. Statistics Finland. Percentage of foreign unemployed jobseekers of the entire foreign workforce at the end of the month by Region, Month and Information. PxWeb. *Statistics Finland* (2026). https://pxdata.stat.fi/PxWeb/pxweb/en/StatFin/StatFin__tyonv/statfin_tyonv_pxt_12tg.px/
43. OECD/EU. *Settling In 2018: Indicators of Immigrant Integration*. (OECD Publishing Paris/European Union, Brussels, (2018). 10.1787/9789264307216-en

Figures

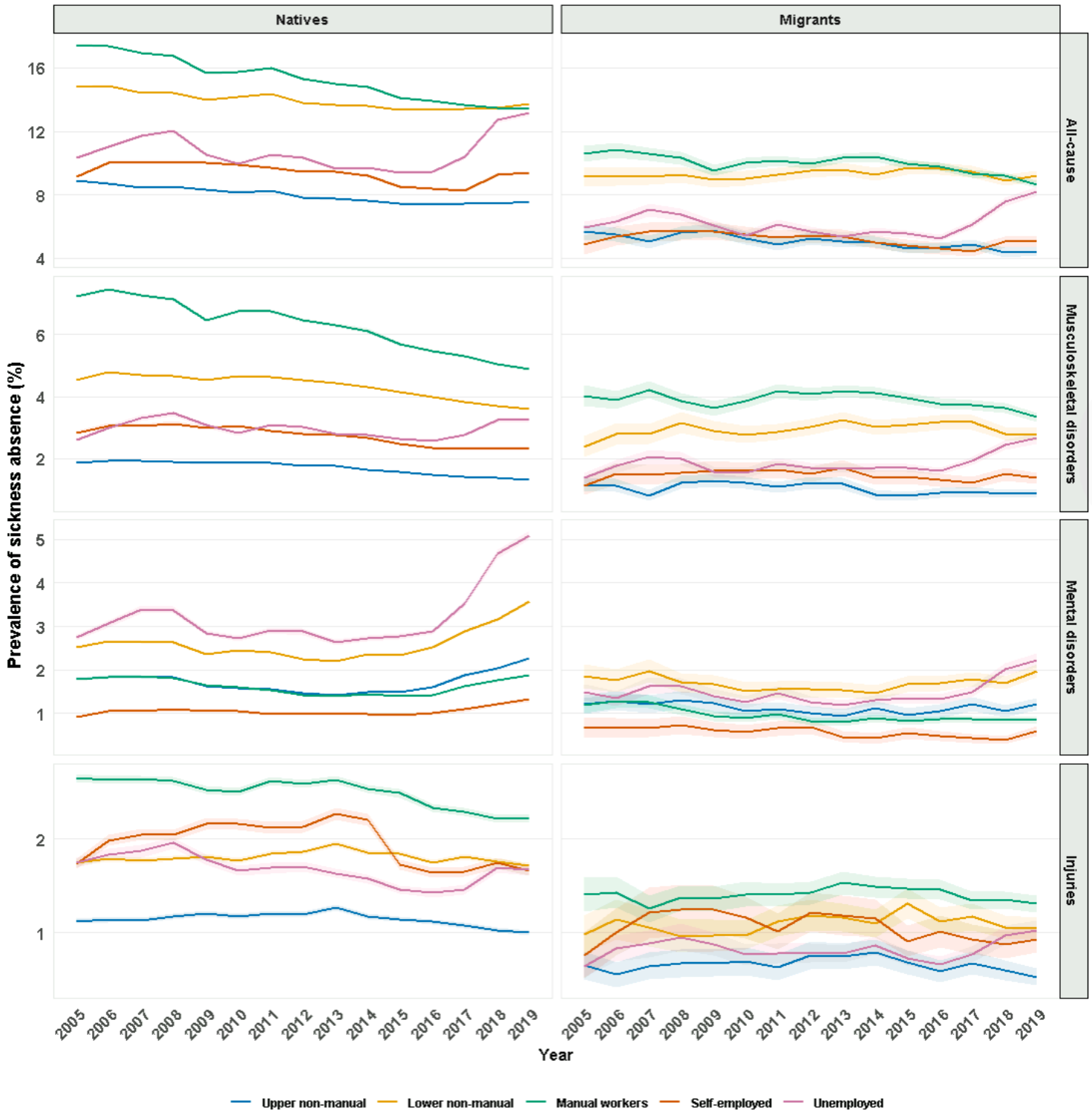


Figure 1

Age-adjusted SA prevalence with 95% CI by diagnostic group and occupational class (Note: the scale of the y-axis differs by diagnostic group).

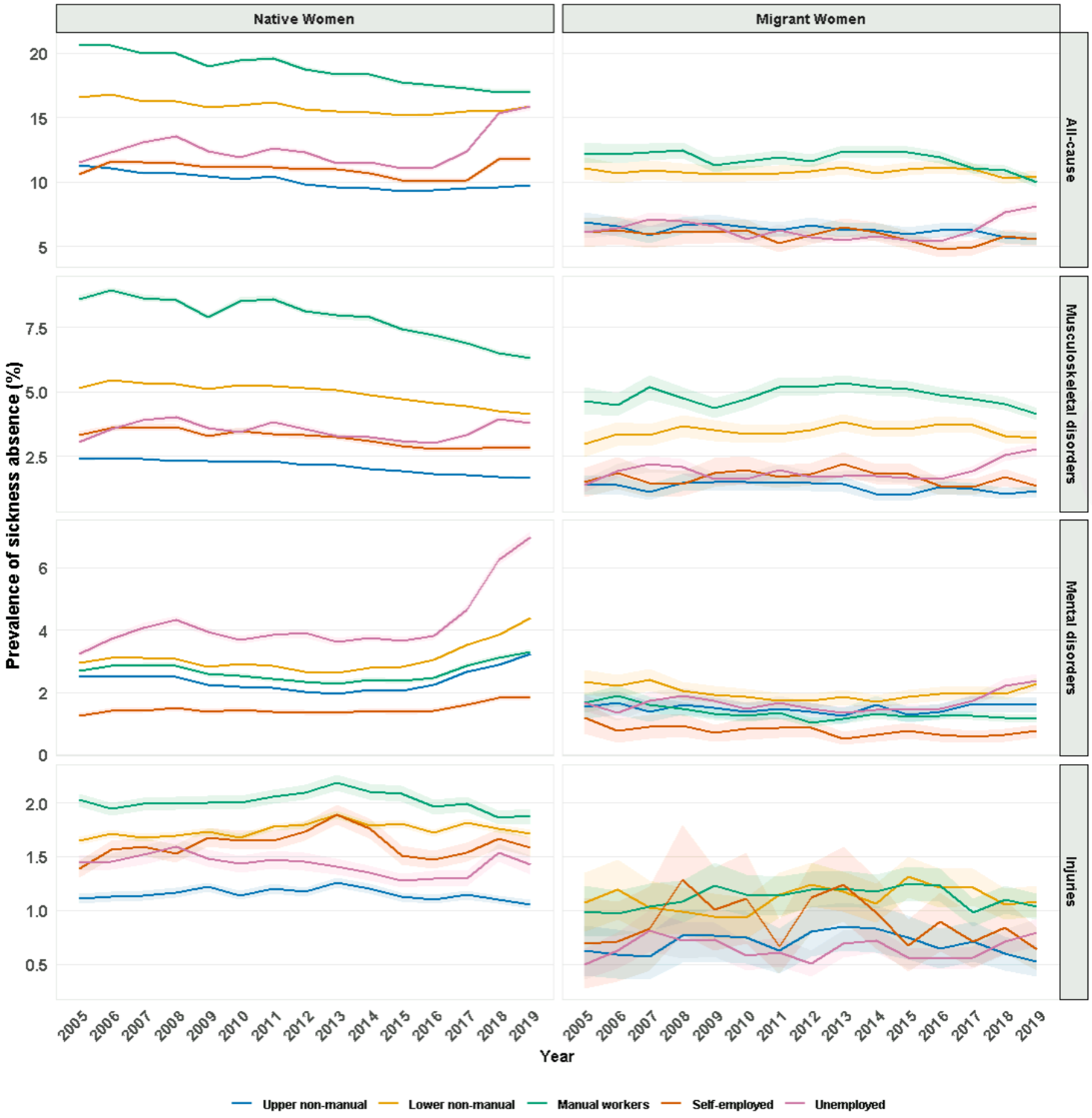


Figure 2

Age-adjusted SA prevalence among women with 95% CIs by diagnostic group and occupational class (Note: the scale of the y-axis differs by diagnostic group).

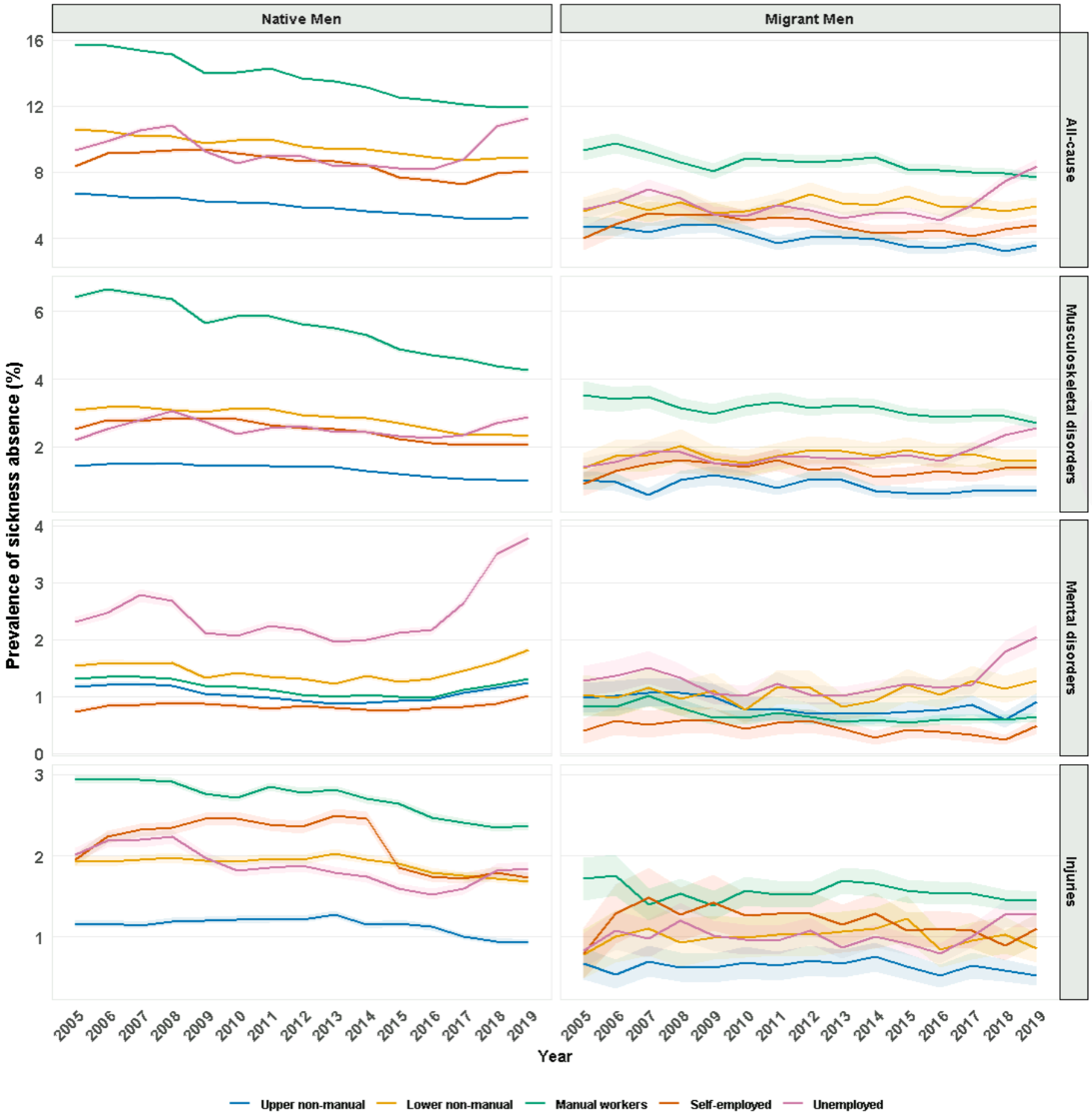


Figure 3

Age-adjusted SA prevalence among men with 95% CI by diagnostic group and occupational class (Note: the scale of the y-axis differs by diagnostic group).

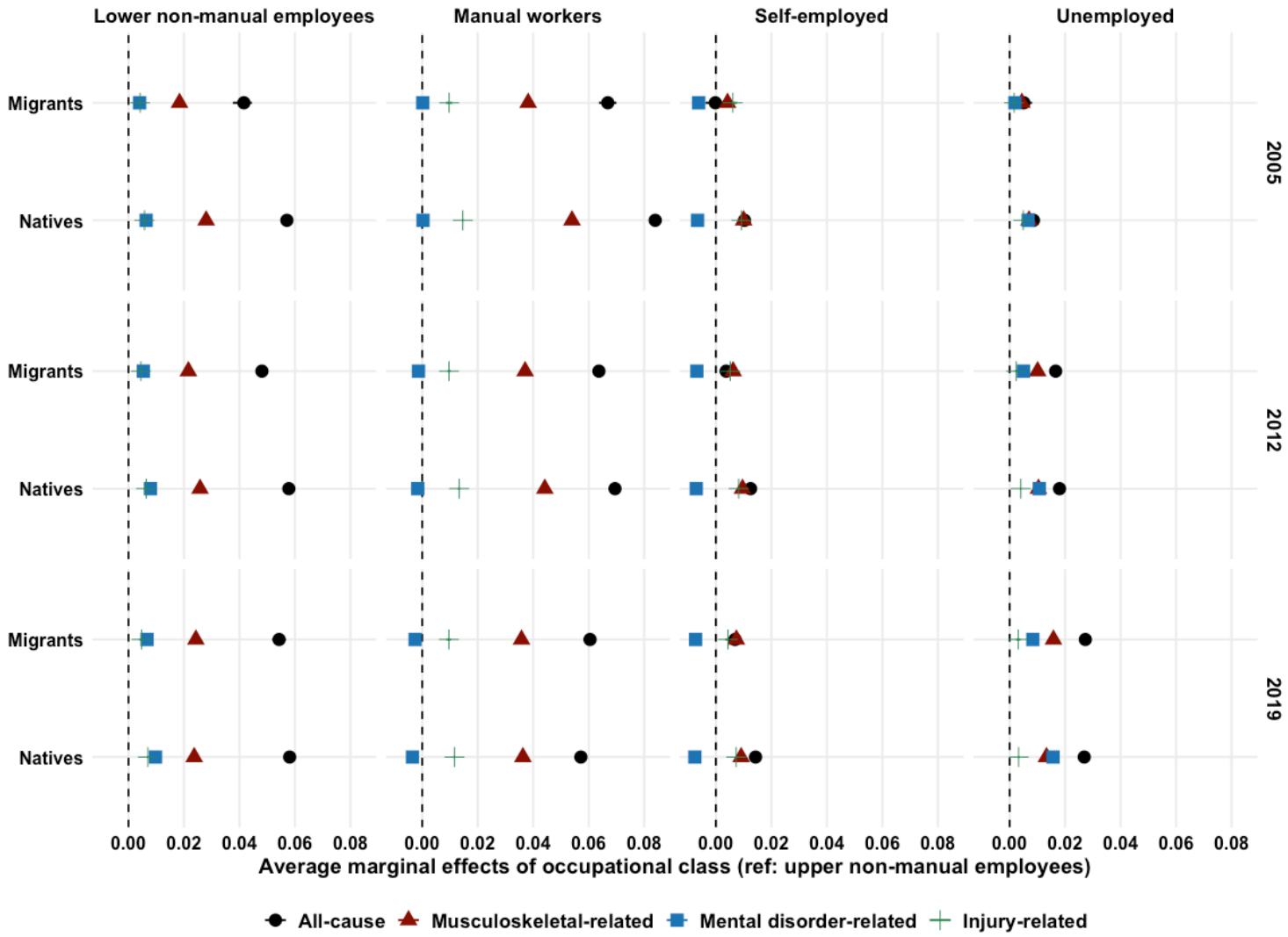


Figure 4

Average marginal effects of occupational class on SA prevalence, with 95% CIs, by migrant status, time, and diagnostic group.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryMaterials.docx