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Gender differences in mental health-related sickness absence in the education sector

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Abstract

Background The education sector experiences high rates of sickness absence, primarily due to mental health disorders. This issue poses significant challenges, not only for the affected employees but also for their colleagues, pupils, the organization, and the society as a whole. Several factors are likely to contribute to this issue, including work-related factors and gender dynamics, as the education sector has a high proportion of female employees.

Methods In this study, we use statistical methods to compare the average duration of sickness absence due to mental disorders in the education sector with other sectors. Additionally, we explore the influence of gender, age, and working hours on the duration of sickness absence. For our study we use a large dataset consisting of approximately 200,000 cases of sickness absence due to mental disorders, with more than 32,000 cases from the education sector.

Results Our analysis shows that average sickness absence duration is consistently longer in the education sector than in other sectors, even after accounting for gender and age. Specifically, the average duration of sickness due to mental disorders in the education sector is 235 days, compared to 188 days in other sectors. We also observe gender differences in absence duration in all sectors, with an interaction effect indicating that working in education affects recovery rates more for men than for women. Consequently, the gender difference in absence duration is smaller in the education sector than in other sectors.

Conclusion Using a large dataset, we find significant differences in absence duration between employees in the education sector and those in other sectors. Other factors, such as gender, also influence sickness absence duration, but to a lesser extent. Notably, the gender effect on absence duration is smaller in the education sector compared to other sectors.

Keywords Sickness absence duration, Gender, Education, Long term sickness absence, Mental disorders

Introduction

Mental disorders, such as stress-related disorders and depression, are widespread among the working population and significantly contribute to long-term sickness absence (LTSA). These absences result in substantial costs for companies, impact the national economy, and considerably affect employees as being in employment is often associated with better quality of life, health and physical functioning [36].

Mental disorders are particularly prevalent in the education sector, contributing to elevated levels of sickness absence [28, 35]. These disorders might be caused

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by elevated stress levels associated with working in this sector. Identified work-related stressors in the education sector include school organization, job demands (such as heavy workloads, student behavioural problems, and over-demanding parents), and a lack of work resources such as personal autonomy and decision-making power [14]. In addition, the teaching job requires a considerable degree of emotional labour, i.e., the process of managing and regulating one's emotions to meet professional expectations [5, 18, 20]. For instance, teachers are expected to remain calm, patient, and supportive with students, even when they are personally stressed. Research shows that emotional labour contributes to emotional exhaustion and is also related to feelings of alienation, as employees suppress their authentic emotions to meet professional standards [32]. Prolonged exposure to these work-related stressors can result in adverse health outcomes such as burnout or increased sickness absence [9]. However, we note that the degree to which stressful events lead to an emotional response depends on the social and emotional competence of a teacher [31].

The elevated sickness absence rates in the education sector might also be caused by non work-related factors such as the over-representation of women in this sector. Studies indicate that female employees report sick more frequently and experience longer periods of sickness absence in comparison to male employees [1, 21–23, 27, 34]. In our previous work we found significant gender differences for mental and musculoskeletal disorders, particularly during the first three months of sickness absence [41]. Halonen et al. [15] studied sickness absence due to depression in several occupational groups and found that sickness absence is higher in female dominated occupations such as teaching.

Based on the above we conclude that the elevated sickness absence in the education sector could either be caused by sector specific characteristics or on the over-representation of women in this sector. Therefore, in this study we will focus in the influence of gender on mental related sickness absence in the education sector compared to other sectors. For this purpose we analyze a large dataset of 199,357 cases of mental related sickness absence, including more than 32,000 cases from the education sector.

Few previous studies focus on mental related sickness absence in the education sector [11, 15, 35]. Roelen et al. [35] studied trends in sickness absence between 2001 and 2007 in several sectors and found that sickness absence for mental disorders is considerably higher in the education sector. Two studies focused on gender differences in stress-related disorders in the education sector [3, 11]. Arvidsson et al. [3] examined burnout levels among nearly 500 Swedish school teachers, finding no significant gender differences. Conversely, Ervasti et al. [11] measured sickness absence among almost 3000 Finnish teachers, and found that female teachers have a higher risk of sickness absence than their male counterparts. However, since these studies focus solely on the education sector, they do not address the interaction between gender and working in this sector.

Our paper is organized as follows. Section 2 describes the dataset and the methods. Section 3 gives both graphical and analytical results, followed by a discussion in Sect. 4.

Methods

Study population and design

In the Netherlands, employers have to ensure that their employees have access to occupational health care, which is typically provided by an occupational health service (OHS). When an employee becomes sick, they report their sickness to their employer, who then sends a sick report to the OHS. The OHS registers the sickness absence and is responsible for guiding the sick employee throughout the period of their absence.

Sickness absence, whether due to work-related or non-work-related injuries and illnesses, is compensated by the employer for up to 104 weeks. Most employers cover 100% of the employee's salary during the first year of sickness absence and 70% during the second year. The OHS provides support to employees throughout these 104 weeks. After this period, the employee may apply for a disability pension through the Employee Insurance Agency (UWV), and the employer may terminate the employment contract.

For our study we retrieve data from a sickness absence register of a large Dutch national OHS. Employees with short-term absences are in general not seen by an occupational health physician (OHP). For longer absence periods it is mandatory to consult an OHP (before 42 days of absence), who reports the diagnosis in the OHS register.

To classify the employees' diagnoses, the OHP uses the Dutch classification system for Occupational and Social insurance physicians (CAS) [44]. This system is based on the 'International Statistical Classification of Diseases and Related Health Problems' (ICD-11) and contains similar main categories [45]. Our dataset includes all reported sickness cases from January 2004 to December 2021 that have been diagnosed by an OHP with a mental disorder, such as adjustment disorder, burnout, depression, or anxiety. The starting point of 2004 was selected due to significant changes in Dutch sickness absence policies that year. Data collection concludes in December 2021, allowing for a follow-up period of up to 104 weeks for all cases.

An overview of all included diagnoses can be found in [44]. When an employee has experienced multiple periods of sickness absence, each period is included in the dataset as a single case. For each case, the duration of sickness is defined as the interval between the first and the last registered day of sickness absence. For further study we select all cases that meet the following inclusion criteria cf. Fig. 1: aged between 18 and 65 years, a sickness absence duration between one day and three years, and working hours ranging from 4 to 44 hours per week. We choose three years as the maximum sickness period because some employers choose to terminate job contracts after three years instead of two. Since employers are financially responsible for sick employees during the first two years of sickness absence, we truncate sickness absences exceeding two years to a duration of exactly two years.

We categorize each sickness absence case based on gender (male, female) and the sector of employment, distinguishing between those working in the education sector and those employed in other sectors. With respect to age, we consider approximately five decades: 21–30, 31–40, 41–50, 51–60, and 61–64. The group between 18 and 20 is so small that we decided to include it in the 21–30 decade, making this group 18–30. As for the last decade, the retirement age was 65 until 2013, after which it was gradually increased in small steps, reaching 67 by 2024. Since we want to track illness durations up to two years, we took 64 as cut-off point. Finally, we differentiate between part-time, mid-range, and (almost) full-time employment by categorizing contracts into the three distinct categories ≤ 24, $24-32$ (excluding the number 24 and including the number 32), and > 32 working hours per week.

Analysis

We determine the weekly recovery (hazard) rates for each sector type (education vs. other sectors) and gender using the Nelson-Aalen estimator [8]. We choose to determine the recovery rates in weeks because the onset and recovery of sickness absence are not evenly distributed across weekdays, with a higher percentage of employees reporting sick and recovering on Mondays.

The estimated hazard function gives the recovery rate at week t, defined as the probability that an employee will recover in week t, given that the employee is still sick at the start of week t. For instance, if 100 employees are

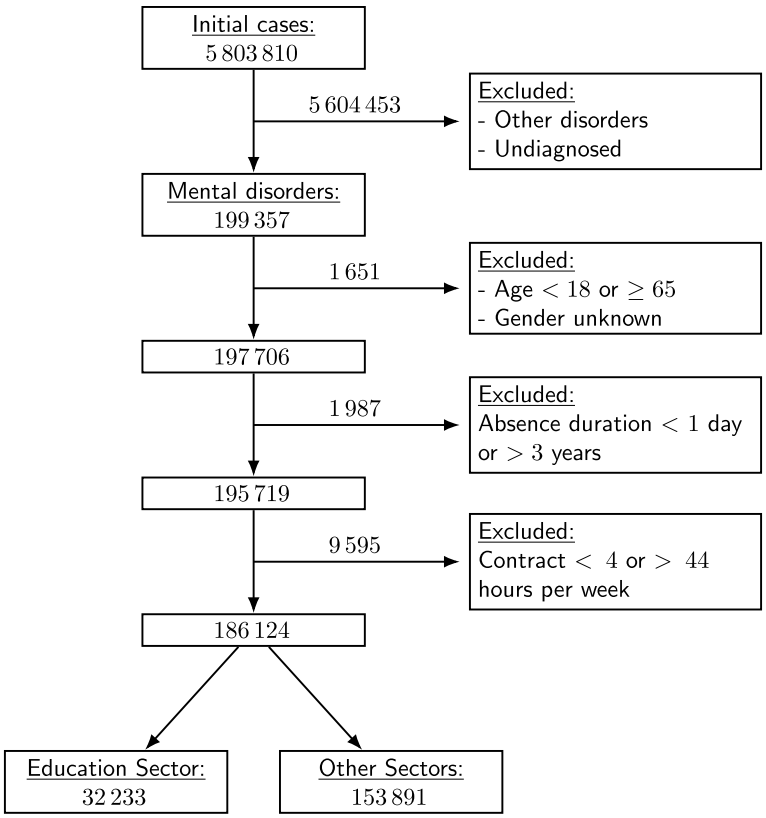

Fig. 1 Flowchart of the inclusion and exclusion of cases used for the analysis

absent at the start of a week, and 2 recover in that week, the recovery rate of that week is 0.02.

Next, we analyze the mean and variance of sickness absence duration categorized by sector type (education vs. other sectors), gender, age, and working hours. The *gender cap*, defined as the difference in absence duration between genders, is determined for each sector, age group, and working hour category. Similarly, the *sector gap*, defined as the difference in absence duration between the education sector and other sectors, is determined for each gender, age group, and working hours category.

To study the influence of gender and sector type on the recovery rate, we use a Cox proportional hazard model, which specifies the adjusted recovery rate at week t for an individual as follows:

$$h(t|\boldsymbol{x}) = h_0(t) \prod_{j=1}^{n} r_j^{x_j} = h_0(t) \prod_{j=1}^{n} e^{\beta_j x_j}. \tag{1}$$

Here, h_0, is the baseline recovery rate, and $r_j = e^{\beta_j}$ is the *hazard ratio* (HR) for the jth covariate x_j. As covariates we use gender (male/female), age (5 sub-classes), weekly working hours (3 sub-classes), and sector type (education/other), hence we have $n = 10$ covariates in Eq. (1). For the baseline $h_0(t)$ we take the recovery rate of a male employee, working in another sector (not in education), aged below 30, and working more than 32 hours per week. Then, to analyze the relation between gender and sector, we augment the hazard model Eq. (1) with an interaction term between gender and the education sector. Thus, we have two recovery models, one with and a second without the interaction factor. By estimating the hazard ratios (with 95% confidence intervals) for each covariate in each model, we can quantify the correlation of gender and sector by simple division, cf., Eq. (2).

We conducted the statistical analysis using the *statsmodels* and *lifelines* libraries in Python 3.10 [10].

Ethical approval

The Institutional Review Board of the Faculty of Economics and Business at the University of Groningen concluded that ethical clearance was not necessary for this study because the Medical Research involving Human Subjects Act does not apply to studies of anonymized register data. Therefore informed consent to participate and consent for publication were not applicable. Consequently, the Board has provided a written statement of no objection.

Results

This section presents our findings. Section 3.1 discusses the recovery rates for men and women in both the education sector and other sectors. Section 3.2 outlines descriptive statistical measures for the duration of sickness absence. Section 3.3 details the hazard ratios derived from the two constructed Cox proportional hazard models as explained in Sect. 2.2.

Graphical results

Figure 2 illustrates the recovery rates for mental disorders among male and female employees in both the education sector and other sectors. This graph indicates that working in the education sector has a greater impact on

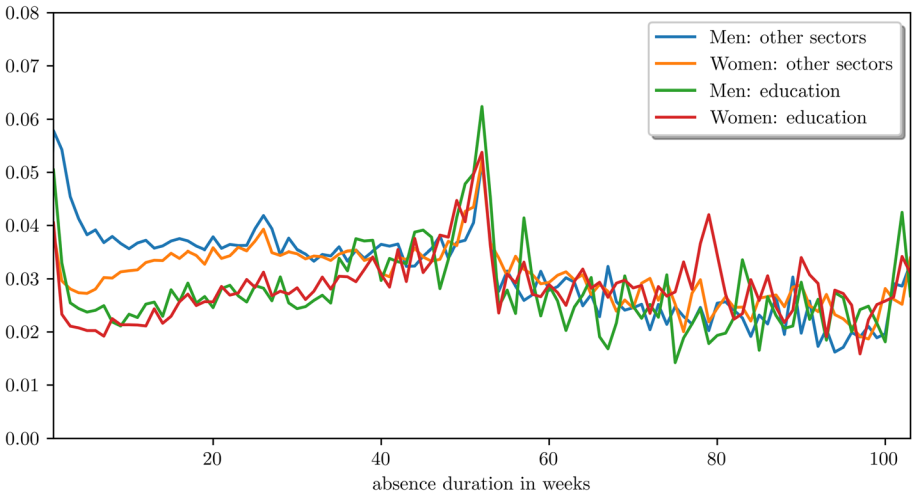

Fig. 2 The recovery rates as a function of time (in weeks) for men versus women working in the education sector versus working in other sectors. Observe, in particular, that during the first 40 weeks of sickness absence, the recovery rates for employees working in the education sector are quite a bit lower than for employees working in other sectors

the recovery rate than gender. During the first 40 weeks, recovery rates in the education sector are consistently lower than in other sectors for both male and female employees. This indicates that a smaller proportion of employees in the education sector recover at any given week compared to those in other sectors.

Additionally, in non-education sectors, recovery rates in the initial months are particularly lower for women than for men, with the rates converging after this period. In contrast, in the education sector, only a small gender gap is observed during the first few weeks, which is clearly less pronounced than the gender gap in other sectors.

Furthermore, there is a significant peak around one year of sickness absence, where recovery rates almost double compared to previous weeks. Notably, in the education sector, this peak is larger for male employees than for female employees.

As time progresses and the number of sick employees decreases, recovery rates become more irregular. Consequently, the calculated recovery rates in the second year shows less precision compared to the first year.

Descriptive results

In the period between January 2004 and December 2021 186,124 sickness cases fulfil our inclusion criteria, cf., Fig. 1. Of all selected cases 45,9% are male, and 54.1% female. The average absence duration is 196 days (± 184 days). From the 186,124 included cases, 32,233 work in the education sector, and 153,891 work in another sector.

Tables 1 and 2 present descriptive statistics on sickness absence duration. Table 1 displays differences in sickness absence between the education sector and other sectors, using gender, age, and working hours as covariates, while Table 2 displays differences in sickness absence between men and women, using sector, age, and working hours as covariates.

Influence of working sector: Education sector versus other sectors Table 1 compares sickness absence duration between the education sector and other sectors. On average, the duration of sickness absence in the education sector is longer, at 235 days, compared to 188 days in other sectors, indicating a sector gap of 47 days (95% confidence interval: 44.3-49.0).

Table 1 also shows that the average absence duration increases with age across all sectors, rising from 183 days in the youngest age group to 217 days in the oldest age group. This age-related increase is more pronounced in the education sector than in other sectors. Consequently, the sector gap is smallest for the youngest age group and gradually increases until the age of 60. Notably, the ageing effect is most significant for men working in the education sector, where the average absence duration increases from 184 days in the youngest age group to 246 days in the oldest age group.

Regarding working hours, the absence duration in the education sector remains consistent across all working hour categories. In contrast, in other sectors, part-time contracts are associated with longer absence durations. As a result, the sector gap is largest for full-time contracts, with a difference in absence duration of 53 days, compared to 34 days for part-time contracts.

Influence of gender Table 2 compares sickness absence durations between male and female employees, categorized by sector, age, and number of working hours. On average, the sickness absence duration for men is 181 days, while for women it is 209 days, resulting in a gender gap of 29 days (95% confidence interval: 27.1-30.4). Across all categories (sector, age, and working hours), women have longer average absence durations than men.

Table 2 also shows that the gender gap in absence duration is smaller in the education sector (10 days) compared to other sectors (26 days). This indicates that the difference in absence duration between men and women is smaller in the education sector than in other sectors.

We observe that the overall gender gap in absence duration (29 days) is larger than the gender gaps observed within each sector individually. This is caused by the unequal distribution of male and female cases across both groups. Specifically, the non-education sector, has a larger number of cases and a more pronounced gender gap, which disproportionately affects the overall average. This illustrates that results can be misleading if cases are not carefully categorized into subgroups [19].

Moreover, in the education sector, the gender gap diminishes with age, starting at 33 days among young employees and decreasing to 5 days in the oldest age group. In contrast, in other sectors, the gender gap in absence duration remains relatively constant across all age groups.

Regarding working hours, we observe that in other sectors, the absence duration of men increases for part-time contracts, while for women, it remains relatively constant. This trend results in a larger gender gap for full-time contracts, with a difference of 24 days compared to 8 days and 1 day for contracts with ≤ 24 hours and $24 - 32$ hours, respectively. However, in the education sector, the gender gap in absence duration actually decreases as working hours increase.

Hazard ratios

Table 3 shows the HRs and 95% confidence intervals for each co-factor for both Cox proportional hazard models. As reference we use the absence duration of men, aged

Table 1 Sector differences in sickness absence. This table compares sickness absence statistics for mental disorders in the education sector with absence statistics in other sectors, categorized by gender, age, and number of working hours. Duration is the mean sickness absence duration (in days) ± standard deviation. The sector gap gives the average difference in sickness absence duration (in days) between the education sector and other sectors, including the 95% confidence interval. OS= other sectors, ES = education sector

	# cases Total	# cases OS	# cases ES	Duration All sectors	Duration OS	Duration ES	Sector gap
All genders	186124	153891	32233	196 ± 184	188 ± 181	235 ± 194	47 (44.3 - 49.0)
Age							
18–30	24676	20957	3719	183 ± 177	178 ± 175	212 ± 182	35 (28.4 - 41.0)
31–40	48850	40961	7889	195 ± 182	188 ± 180	230 ± 188	42 (37.6 - 46.6)
41–50	54694	46244	8450	192 ± 182	185 ± 180	231 ± 192	46 (41.2 - 50.0)
51–60	48165	38407	9758	205 ± 191	194 ± 186	247 ± 203	53 (48.7 - 57.6)
61–64	9739	7322	2417	217 ± 188	207 ± 184	249 ± 198	42 (33.1 - 51.0)
Working Hours							
≤ 24	39155	29133	10022	211 ± 191	202 ± 188	236 ± 196	34 (29.2 - 38.0)
24-32	39242	31158	8084	212 ± 185	205 ± 183	239 ± 192	34 (29.8 - 39.1)
>32	107727	93600	14127	185 ± 181	178 ± 177	231 ± 195	53 (49.8 - 56.6)
Men	85273	76512	8761	181 ± 182	175 ± 179	227 ± 197	52 (47.7 - 56.3)
Age							
18–30	8277	7711	566	163 ± 174	161 ± 174	184 ± 176	23 (8.2 - 38.2)
31–40	19414	17923	1491	172 ± 176	169 ± 175	209 ± 183	40 (30.1 - 49.4)
41–50	25618	23558	2060	175 ± 179	171 ± 177	219 ± 194	48 (38.9 - 56.2)
51–60	26166	22660	3506	192 ± 189	184 ± 185	241 ± 206	57 (49.6 - 64.1)
61–64	5798	4660	1138	209 ± 186	199 ± 182	246 ± 195	47 (34.4 - 59.4)
Working Hours							
≤ 24	4470	3433	1037	201 ± 208	196 ± 207	219 ± 209	24 (9.3 - 38.2)
24 − 32	8414	6974	1440	208 ± 195	204 ± 194	226 ± 197	22 (10.6 - 32.9)
> 32	72389	66105	6284	176 ± 178	171 ± 176	229 ± 195	58 (52.8 - 62.8)
Women	100851	77379	23472	209 ± 185	201 ± 182	238 ± 193	37 (34.0 - 39.5)
Age							
18–30	16399	13246	3153	193 ± 177	187 ± 175	217 ± 183	30 (23.2 - 37.3)
31–40	29436	23038	6398	210 ± 184	203 ± 182	235 ± 189	32 (27.1 - 37.5)
41–50	29076	22686	6390	207 ± 184	200 ± 181	235 ± 192	35 (29.8 - 40.3)
51–60	21999	15747	6252	220 ± 192	208 ± 186	250 ± 202	42 (36.6 - 48.2)
61–64	3941	2662	1279	230 ± 192	220 ± 186	251 ± 200	31 (18.2 - 44.3)
Working Hours							
≤ 24	34685	25700	8985	212 ± 189	203 ± 186	238 ± 194	35 (30.0 - 39.3)
24 − 32	30828	24184	6644	213 ± 183	205 ± 180	242 ± 190	37 (32.0 - 42.2)
> 32	35338	27495	7843	203 ± 184	195 ± 180	233 ± 195	38 (33.7 - 43.3)

< 30 years, working > 32 hours per week (i.e. full-time) in another (non-education) sector. Hazard ratio's smaller than one represent a longer sickness absence duration than the reference.

We note that, in both models the working sector has the largest influence on the HR, where working in the education sector is associated with a longer expected absence duration. Female gender, older age, and part-time work are also associated with lower HRs resulting in a longer expected sickness duration.

Moreover, Table 3 shows an interaction effect between gender and sector, with a hazard ratio (HR) of 1.09. This interaction effect indicates that the impact of gender on the recovery rate differs for employees in the education sector compared to other sectors.

According to our interaction model, the adjusted HR for men in the education sector compared to men in other sectors is 0.78 (CI :0.76 − 0.80), cf Table 3. For women the adjusted HR for working in the education sector compared to working in other sectors is

Table 2 Gender differences in sickness absence. This table presents sickness absence statistics for mental disorders per gender, categorized by working sector, age, and number of working hours. Duration is the mean sickness absence duration (in days) ± standard deviation. The gender gap gives the average difference in sickness absence duration (in days) between the male and female employees, including the 95% confidence interval

Sector	# cases	# men	# women	Duration	Duration ♂	Duration ♀	Gender gap
All sectors	186124	85273	100851	196 ± 184	181 ± 182	209 ± 185	29 (27.1 - 30.4)
Education	32233	8761	23472	235 ± 194	227 ± 197	238 ± 193	10 (5.4 - 15.0)
Age							
18–30	3719	566	3153	212 ± 182	184 ± 176	217 ± 183	33 (17.0 - 48.7)
31–40	7889	1491	6398	230 ± 188	209 ± 183	235 ± 189	26 (15.7 - 36.5)
41–50	8450	2060	6390	231 ± 192	219 ± 194	235 ± 192	16 (6.3 - 25.5)
51–60	9758	3506	6252	247 ± 203	241 ± 206	250 ± 202	10 (1.1 - 18.0)
61–64	2417	1138	1279	249 ± 198	246 ± 195	251 ± 200	5 (-10.7 - 20.9)
Working Hours							
≤ 24	10022	1037	8985	236 ± 196	219 ± 209	238 ± 194	18 (5.1 - 31.8)
24 – 32	8084	1440	6644	239 ± 192	226 ± 197	242 ± 190	17 (5.5 - 27.8)
> 32	14127	6284	7843	231 ± 195	229 ± 195	233 ± 195	4 (-2.2 - 10.7)
Other Sectors	153891	76512	77379	188 ± 181	175 ± 179	201 ± 182	26 (23.7 - 27.3)
Age							
16–30	20957	7711	13246	178 ± 175	161 ± 174	187 ± 175	26 (20.9 - 30.7)
31–40	40961	17923	23038	188 ± 180	169 ± 175	203 ± 182	34 (30.1 - 37.0)
41–50	46244	23558	22686	185 ± 180	171 ± 177	200 ± 181	28 (25.1 - 31.6)
51–60	38407	22660	15747	194 ± 186	184 ± 185	208 ± 186	24 (20.2 - 27.7)
61–64	7322	4660	2662	207 ± 184	199 ± 182	220 ± 186	21 (11.9 - 29.5)
Working Hours							
≤ 24	29133	3433	25700	202 ± 188	196 ± 207	203 ± 186	8 (0.3 - 14.9)
24 – 32	31158	6974	24184	205 ± 183	204 ± 194	205 ± 180	1 (-3.8 - 6.4)
> 32	93600	66105	27495	178 ± 177	171 ± 176	195 ± 180	24 (21.0 - 26.1)

0.84 CI :0.83 – 0.86. This can be calculated by substituting the values for $r_j = e^{\beta_j}$ in Eq. (1) as follows:

$$\mathrm{HR} = \frac{\mathrm{r_{female}} \times \mathrm{r_{edu}} \times \mathrm{r_{female \times edu}}}{\mathrm{r_{female}}} = \frac{0.89 \times 0.78 \times 1.09}{0.89} = 0.84 \quad \mathrm{CI}: 0.83 - 0.86 \tag{2}$$

These HRs indicate that a sector effect exists, i.e. the expected sickness absence durations for both men and women in the education sector are longer compared to their counterparts in other sectors.

Similarly, we determine the gender effect by comparing adjusted recovery rates for men and women. In the education sector the adjusted HR for women compared to men is 0.96.

$$\mathrm{HR} = \frac{\mathrm{r_{female}} \times \mathrm{r_{edu}} \times \mathrm{r_{female \times edu}}}{\mathrm{r_{male}} \times \mathrm{r_{edu}}} = \frac{0.89 \times 0.78 \times 1.09}{1.0 \times 0.78} = 0.96 \quad \mathrm{CI}: 0.94 - 0.99 \tag{3}$$

The HR for women compared to men in other sectors is 0.90 (CI 0.88-0.91). This indicates that the gender effect is very small in the education sector. This is caused by the interaction effect, which indicates that the combination of gender and sector has less influence together than when both factors are acting independently. As a result, working in the education sector affects recovery rates more for men than for women.

Discussion

Summary of findings Our main finding is that sickness absence in the education sector is considerably longer than in other sectors, even after adjusting for age, gender, and working hours. Our second main finding is that gender differences exist in all sectors, but that the gender gap

Table 3 Hazard ratios (HRs) for absence duration including the 95% confidence intervals. The first model contains sector, gender, age, and working hours as independent variables. The second model also contains a variable for interaction effects between sector and gender

	Model without interactions			Model with interaction gender/sector		
	HR (95% conf)	**z-value**	***p*-value**	**HR (95% conf)**	**z-value**	***p*-value**
Sector						
other sectors	1.00					
education	0.82 (0.81 - 0.84)	-29.80	< 0.005	0.78 (0.76 - 0.80)	-21.19	< 0.005
Gender						
male	1.00					
female	0.90 (0.89 - 0.91)	-18.76	< 0.005	0.89 (0.88 - 0.90)	-19.62	< 0.005
Age						
< 30	1.00					
age 31–40	0.95 (0.94 - 0.97)	-6.13	< 0.005	0.95 (0.94 - 0.97)	-6.16	< 0.005
age 41–50	0.96 (0.94 - 0.97)	-5.18	< 0.005	0.96 (0.94 - 0.97)	-5.23	< 0.005
age 51–60	0.90 (0.89 - 0.92)	-12.76	< 0.005	0.90 (0.89 - 0.92)	-12.70	< 0.005
age 61–64	0.84 (0.82 - 0.87)	-13.54	< 0.005	0.85 (0.83 - 0.87)	-13.35	< 0.005
Working hours						
≤ 24	0.95 (0.93 - 0.96)	-8.29	< 0.005	0.95 (0.93 - 0.96)	-8.15	< 0.005
hours 24 — 32	0.93 (0.91 - 0.94)	-11.62	< 0.005	0.93 (0.92 - 0.94)	-11.36	< 0.005
> 32	1.00					
Gender * sector						
female * education				1.09 (1.06 - 1.12)	5.82	< 0.005

in the education sector is smaller than in other sectors. Third, we observe that the influence of age and working hours on absence duration is different for men and women, and also depends on the working sector. Finally, we see that recovery rates for both the education sector and other sectors sharply increase around one year of sickness absence.

In the remainder of this section we investigate several hypotheses to explain the above mentioned findings. First, we approach sickness absence from a sociological point of view and explore specific characteristics of each sector. Then, we examine the influence of work-related factors. Lastly, we explore more individual-related factors such as age, gender, and coping characteristics.

Sector characteristics The high sickness absence durations in the education sector may be attributed to specific characteristics of the sector. One unique characteristic is that women are over-represented in this sector, which may lead to a 'gender composition effect'. This effect suggests that sickness absence is particularly high in workplaces dominated by the opposite gender. Several studies confirm that there is indeed an U-shaped relationship between gender composition of the occupation and sickness absence [16, 27]. Other studies however find no evidence for this so-called gender-composition effect [26, 30]. Melsom et al. explored gender composition effects in more detail among Norwegian employees, and find that these effects disappear after controlling for individual characteristics, indicating that gender effects are primarily caused by the over-representation or selection of absence-prone individuals in female-dominated sectors [30]. Below we further discuss selection effects.

Another characteristic of the education sector that might influence sickness absence are collective agreements on salary payments during sickness. According to Dutch law, employers should pay at least 70% of the former salary during the first two years of sickness absence. In the education sector, due to collective labour agreements, the salary during the first year of sickness absence is 100% of the former salary, which is reduced to 70% in the second year of sickness absence. From Fig. 2, we observe that the recovery rate notably increases around one year of sickness absence. This peak is likely due to the change in salary after one year, as corroborated by our previous study examining the influence of sickness absence regulations on duration and cost [42].

This observed peak in recovery rates around one year suggests that salary adjustments are an important motivator in the recovery process, particularly affecting the rate of return to work. Notably, this financial incentive appears to have a greater impact on male employees, as

indicated by a higher peak in their recovery rates compared to their female counterparts.

Another aspect that influences sickness absence is the existence of a certain absence culture. An absence culture reflects an organization's collective beliefs and attitudes about what is considered normal or acceptable absenteeism, including common views on the reasons for being absent and how employees perceive their own and other's absenteeism. This concept shifts absenteeism from being solely an individual's choice to a phenomenon that must be considered within a collective context. Such cultures can develop in various groups, including organizations, occupations, national populations, or along gender lines. The over-representation of one gender, combined with the generous absence regulations in the education sector, may have led to an absence culture with more lenient norms regarding sickness absence [24, 26].

Job-related factors The prolonged duration of sickness absence in the education sector is often attributed to job-related factors, widely recognized as major contributors to stress and burnout. This is supported by a substantial body of research that underscores the high-stress nature of jobs in the education sector, caused by factors such as heavy workloads, complex interpersonal interactions, limited task variety, and administrative demands [3, 6, 38, 40, 43].

Another important aspect of the teaching profession is the substantial emotional labour it demands. Teachers are expected to consistently display feelings of support and care, while suppressing emotions such as anger or impatience. Emotional labour can influence the core components of burnout in different ways. First, it may lead to emotional exhaustion, where there is a depletion of emotional resources [18, 20, 25]. Second, prolonged emotional labour can result in depersonalization, a state in which teachers become emotionally detached from their students, leading to diminished empathy and more cynical attitudes.

The conservation of resources (COR) model helps explain the mediating role of emotional labour in the development of burnout. According to this theory, resources are finite, and stress occurs when resources are depleted [17]. A high level of dissonance between a teacher's genuine emotions and the emotions they are expected to display, can result in a depletion of psychological resources, potentially leading to burnout. This is consistent with our study findings, which show that sickness absence duration increases with age, possibly due to the gradual depletion of resources.

Conversely, when there is greater alignment between authentic and displayed emotions, emotional labour can have positive effects, enhancing feelings of personal accomplishment [18]. This underscores the importance of personality treats in moderating the impact of emotional labour.

Another factor contributing to stress in the education sector may be the effort-reward imbalance, which states that stress occurs when there is a perceived lack of reciprocity between the efforts teachers invest in their work and the rewards they receive, such as salary, promotion opportunities, or appreciation [37]. Employees in the education sector may experience high work load and low rewards in terms of job esteem and promotional opportunities.

Although job-related stressors are largely similar across the teaching profession, some teachers experience significantly more stress than others. In the next section, we explore person-related factors that may account for these differences. It is also notable that many teachers, despite experiencing high levels of stress, choose to remain in their roles, a phenomenon we will discuss further through the concepts of selection effects and being "locked in" to their positions.

Person-related factors The interpretations discussed above assume that distinctive features of the education sector contribute to a longer sickness absence duration. However, person-related factors and selection effects may also contribute to the observed patterns in sickness absence in this sector. Person-related factors include demographic features such as gender, age, and working hours, and individual characteristics such as coping behaviour and work attitudes. Personal traits that correlate with high stress levels and increased susceptibility to burnout include a passive coping style, a low sense of control over events, and a predisposition towards emotion-driven behaviour [25]. On the other hand, individuals with proactive personalities actively take initiative to adjust their work environment, thereby maintaining engagement and performance [4].

Our study shows that, across most categories (age, gender, and working hours), the differences in sickness absence duration between sectors are relatively consistent. Exceptions are among young male employees (18–30 years) and male employees working part-time ($\leq$ 32 hours/week). In these groups, the difference in absence duration between the education sector and other sectors is relatively small. considering young men, the absence duration in the education sector only slightly differs from other sectors, and then increases faster with age, resulting in an increasing sector gap with age. Consequently, the gender gap in the education sector is largest among young employees, and then gradually diminishes. Further

research is needed to explore why the gender gap in the education gap is decreasing with age, and whether this is caused by either personal, social, or work-related characteristics.

Selection effects The observed sickness absence in the education sector might also be caused by *selection effects*, meaning that individuals with pre-existing health conditions or predispositions may self-select into jobs they perceive as less physically demanding or more supportive. McLeod et al. [29] discuss how this selection effect can lead to a concentration of individuals with higher health risks in certain sectors. In the context of education, the high job security, predictable schedule, and supportive environment might attract individuals with a higher predisposition to mental health issues, leading to a concentration of employees more vulnerable to sickness absence.

In a recent study, Melsom et al. [30] found that high sickness absence in female-dominated occupations is mainly caused by the selection of absence-prone individuals in these sectors. This suggests that the education sector, which has a higher proportion of female employees, might experience elevated sickness absence rates partly due to this selection effect.

This concept of selection effects is also observable among part-time workers. The higher incidence of sickness in part-time roles could be a consequence of job conditions—for example, the need to accomplish more in less time—or it might be that individuals with health issues or complex personal situations opt for part-time work. Our findings align with this, showing that part-time contracts are associated with longer sickness absence among men. In contrast, for women, our results indicate no significant difference in absence duration between full-time and part-time workers. This discrepancy might be due to the greater societal acceptance of part-time work for women in the Netherlands compared to men.

Moreover, selection effects may manifest in the opposite direction. Employees with certain personality traits or coping styles might choose to stay in the same job even when working conditions are unsatisfactory. This dynamic further complicates the relationship between job conditions and health outcomes.

Locked in effects The phenomenon where employees remain in a job despite dissatisfaction is referred to as being *stuck* or *locked in the job*. This often occurs in secure but undesirable positions, or when employees perceive their employability outside their current role as low [12, 39]. Such situations can lead to psychological strain and may adversely affect mental health [2, 7].

The education sector is known for its high job security, stable working conditions, and extended holidays. On the other hand, teachers and other educational professionals may perceive their employability as limited, feeling that few other jobs align with their qualifications. This combination of a secure job and an low employability may cause that employees in the education sector get stuck in their undesired but secure occupation, leading to mental strain and increased sickness absence.

Furthermore, as employees approach the latter stages of their careers, they often find themselves in the most secure and permanent positions, which may contribute to an increased *locked-in effect*. This phenomenon might contribute to the higher rates of sickness absence observed among older age groups. Being locked in the job will also have consequences for the organization. Employees feeling *locked-in* at the job will have lower levels of affective organizational commitment [13], which can negatively impact the organization and its other employees, potentially leading to further increases in sickness absence.

Future research could investigate the factors that motivate employees to remain in less desirable positions, or assess how workplace policies and job security regulations could influence career path changes.

Strengths and limitations This study has several strengths. First, it analyzes a very large dataset from a large occupational health service. Second, all cases of sickness absence have been diagnosed with a mental disorder by an occupational health physician. Although the validity of mental diagnoses in occupational medicine is still being discussed [33], the use of OP-certified SA is better than relying on employee-reported mental health. A further strength of the study is that a number of relevant predictors were assessed in the regression analysis such as age, gender, and working hours. A limitation of the study is that it is a retrospective study where only a small number of covariates is known from the occupational health register. Other relevant factors that could potentially influence sickness duration are not captured. For example, information on job-related factors such as workload and work variety, and person-related factors like coping mechanisms, is unavailable. Future research should explore these additional factors and their interactions would be valuable.

In this study, we compare the education sector at a societal level with other sectors. A follow-up study could offer valuable insights by refining the analysis to differentiate within the education sector itself, distinguishing between primary, secondary, and higher education, as well as between teaching and administrative staff.

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None.

Authors' contributions
ST is the main author of the manuscript and is responsible for the intellectual ideas, planning, the statistical analyses and writing the manuscript. ND checked the analyses mathematically. WvR was a major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials
The data that support the findings of this study are available from the authors/organisation upon reasonable request. The contacts for this request are Sheila Timp (sheila.timp@arbounie.nl) and/or the data department of Arbo Unie (datateam@arbounie.nl).

Declarations

Ethics approval and consent to participate
The Institutional Review Board of the Faculty of Economics and Business at the University of Groningen concluded that ethical clearance was not necessary for this study because the Medical Research involving Human Subjects Act does not apply to studies of anonymized register data. Therefore informed consent to participate and consent for publication were not applicable. Consequently, the Board has provided a written statement of no objection.

Competing interests
The authors declare no competing interests.

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