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COVID-19 infection and later risk of sickness absence by socioeconomic status: a cohort study

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Abstract

Background The COVID-19 pandemic was a significant health risk and resulted in increased sickness absence during the pandemic. This study examines whether a history of COVID-19 infection is associated with a higher risk of subsequent sickness absence.

Methods In this prospective cohort study, 32,124 public sector employees responded to a survey on COVID-19 infection and lifestyle factors in 2020 and were linked to sickness absence records before (2019) and after (2021–2022) the survey. Study outcome was annual sickness absence defined as the total number of sickness absence days and the number of short sickness absence spells (< 10 days) and long sickness absence spells (10–365 days). We used negative binomial regression adjusting for sex, age, employment characteristics, body mass index, health behaviors in 2020 and sickness absence in 2019. We examined differences in sickness absence between socioeconomic statuses (SES), measured by occupational titles from employers' records.

Results A self-reported COVID-19 infection in 2020 was associated with higher subsequent risk of sickness absence in 2021: Adjusted Incidence Rate Ratio (IRR) compared to those not reporting COVID-19 was 1.23, 95% confidence interval (CI) 1.10–1.37 for sickness absence days, 1.29, 1.20–1.38 for short sickness absence spells and 1.20, 1.04–1.37 for long spells. The association was strongest in employees with intermediate SES: 1.45, 1.20–1.77 days, 1.42, 1.26–1.61 short spells, and 1.30, 1.03–1.64 long spells. For employees with low and high SES, an association was observed only for short spells.

Conclusions Employees who reported contracting first-wave COVID-19 infection had higher rates of sickness absence in the following year. This excess risk was most consistently observed in employees with intermediate socioeconomic status (e.g. office workers, registered nurses, and social workers).

Keywords Finland, Prospective study, Absenteeism, SARS-CoV-2, Sick leave, Work ability

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Background

The COVID-19 pandemic caused a significant burden for healthcare and economy around the world in 2020 [1, 2]. Episodes of sickness absence due to COVID-19 were often long. In Sweden, for example, a median of 35 days was reported and 3% were still absent after one year [3]. A British study found that 69% of individuals hospitalized for COVID-19 had fully returned to work in a year, 16% had returned to work partially, and 15% did not return to work [4]. COVID-19 infection has been associated with long term physiological changes after the acute infection [5], which could affect future morbidity. Also, with COVID-19 many societal, work, and workplace practices changed significantly. Remote work, for instance, became increasingly common [6]. These changes could influence employees' behavior in general regarding sickness absence, but in particularly those who had had a COVID-19 infection.

Sickness absence rates have been previously showed to vary substantially between different socioeconomic status (SES) groups, with lower SES groups generally having higher rates [7]. These associations are, however, not straightforward and may vary in relation to absence duration and frequency [8]. The risk of exposure to COVID-19 infection was higher in certain sectors of work such as health care and education services, such as nurses and kindergarten teachers, which belong to the intermediate occupational classes and were in the front-line meeting individuals carrying the virus [9, 10]. Consequently, sickness absences were more common in these occupational groups during the pandemic [3, 11]. However, little is known on the association between COVID-19 infection and sickness absence after the initial pandemic. Therefore, we examined the long-term associations between a COVID-19 infection and subsequent sickness absence during the two years following the COVID infection and whether these associations differed between occupation-based socioeconomic statuses.

Methods

Study design and population

This is a prospective study. Data were collected in the Finnish Public Sector Study (FPS) [12–14]. The Finnish public sector provides e.g. healthcare, social services, and education, whose employees represent nearly 50% of all occupational groups in the sector. To achieve a population with relatively similar exposure to SARS-Cov-2 virus, the eligible population were the employees of the four largest cities located in Southern Finland (N=58,971). We used data from the participants who had responded to the FPS survey in September -October 2020 and consented to register linkage (N=42,572, response rate 73%). We linked survey data of self-reported COVID-19 infection with employer register data of sickness absence in 2019 (before infection) and 2021 (after infection). We excluded participants with no person-years during 1.1.2019–31.12.2021 (n=5395) and those with missing data on relevant variables (n=5053). This resulted in an analytic sample of 32,124 participants.

When further stretching the follow-up time of sickness absence to 31.12.2022, we only had data from three cities (N=28,432). After excluding participants with missing data on relevant variables, the analytical sample included 24,405 participants.

Exposure

The participants were asked to indicate if they (a) have had a COVID-19 infection in 2020 suspected by themselves or a doctor (primary analysis), and (b) have had a laboratory test confirmed COVID-19 infection (sensitivity analysis).

Outcomes

In the total population, sickness absence follow-up was 1.1.-31.12.2021. We combined overlapping and subsequent sickness absence episodes, and separately examined the number of short (1–9 days) episodes and number of long (10+days) episodes, as well as total number of annual sickness absence days. The cut-off for long episodes was eligibility to compensation from the Social Insurance Institution of Finland (KELA). In a subpopulation where data was available, the follow-up time was 1.1.2021–31.12.2022. The variables were as described above: number of days, number of short (1–9 days) episodes, and number of long (10+days) episodes of sickness absence in 2021–2022.

Socioeconomic status

We used occupational titles obtained from the employers' records to divide participants into three groups of socioeconomic status (SES) based on the International Standard Classification of Occupations (ISCO) [15]: high (managers and senior specialists such as physicians and teachers), intermediate (specialists, such as office workers, customer service, registered nurses, social workers) and low (manual workers such as construction workers, cleaning services workers, kitchen workers, and practical nurses).

Covariates

To control for baseline levels of sickness absence, we assessed sickness absence days per person-months in 2019. Other covariates included sex and age in 2020, both obtained from the registers of the employers. In the FPS survey we additionally measured the type of the job contract (permanent, temporary), working time mode (full-time, part time) and whether the participant was transferred to working from home during the pandemic

(yes, no). The participants also reported their weight in kg and height in cm and body mass index (BMI) was calculated as weight in kg divided by height in m^2. Excessive alcohol consumption was determined based on reported weekly alcohol units (1 unit estimated as 12 g of alcohol) and categorized into three groups: none (0 units) moderate (12–140 g, 1–11 units) and heavy (>140 g, >11 units) [16]. Smoking status was based on a question: Do you smoke? and it was categorized into three groups non-smokers, former smokers, and smokers [17]. Physical activity was inquired by asking respondents how much they exercised in general, including walking or biking to work and leisure time activities and transformed into metabolic equivalent task (MET) hours per day [18].

Statistical analysis

We used Chi-Square statistic to examine the differences of the categorical and ANOVA for the continuous covariates. We compared SA days, short SA periods (1–9 days) and long SA periods (10+days) in 2021 and 2022 of employees having had a COVID-19 infection in 2020 to other employees.

Using negative binomial regression models, we calculated Incidence Rate Ratios (IRRs) and 95% confidence intervals (CI) while adjusting for sickness absence in 2019 (before COVID-19 infection), age, sex, working time mode, job contract, working from home, smoking, alcohol consumption, body mass index, daily exercise and SES. To analyze the modifying effects of SES, we included the interaction term 'SES × COVID-19 infection' in the crude models. Crude interaction between COVID-19 and SES was statistically significant for SA days ($p=0.017$) but did not reach statistical significance for sickness absence episodes of 1–9 days ($p=0.07$), and SA episodes of 10 or more days ($p=0.30$). As the crude models suggested some effect modification, we included the interaction term also to adjusted models and calculated the estimates and adjusted means by SES. All analyses were performed with SAS 9.4.

Results

The descriptive characteristics of the participants are shown in Table 1. Of the 32,124 participants, 77% were women and the mean age was 46 years. The participants had on average 13.2 sickness absence days in 2021. Of the participants, 3.4% reported they had had a COVID-19 infection in 2020. Those who reported that they had had a COVID-19 infection in 2020 had had more sickness absence days in 2019; mean (SD) 1.34 (2.68) vs. 1.06 (2.33) sickness absence days per person-month in 2019, $p<0.001$.

After adjustment for the covariates and SES, self-reported COVID-19 infection was associated with higher subsequent incidence rate ratios of SA (days: IRR=1.23, 95% CI 1.10–1.37; short episodes: 1.29, 1.20–1.38; long episodes: 1.20, 1.04–1.37) compared to not reporting a COVID-19 infection.

Table 2 shows the associations of COVID-19 infection in 2020 with SA in 2021, stratified by SES. Participants reporting COVID-19 infection in the intermediate SES category had the highest adjusted incidence rate ratios for all measures of sickness absence (days: IRR=1.48, 95% CI 1.20–1.77; short episodes: 1.42, 1.26–1.61; long episodes: 1.30, 1.03–1.64) compared to those not reporting COVID-19 infection. We observed a higher incidence rate ratios for short sickness absence episodes also for participants reporting COVID-19 infection in the low SES and high SES categories (low SES: IRR 1.21, 95% CI 1.05–1.41; high SES: IRR 1.23, 95% CI 1.11–1.37) compared to those not reporting a COVID-19 infection. The effect size was, however, smaller than in the intermediate SES group.

Figure 1 presents the adjusted mean of sickness absence days and episodes per person-year stratified by SES, that is, the absolute differences in sickness absence between those reporting COVID-19 infection and those not. Participants reporting COVID-19 infection had on average 3.6 days per year more sickness absence than those who did not report a COVID-19 infection. Participants in the low SES group had the highest mean of sickness absence irrespective of the absence measure. However, the absolute difference between those reporting COVID-19 infection and those not, was largest for participants with intermediate SES.

Table 3 shows the associations of COVID-19 infection in 2020 in the subpopulation with SA follow-up for 2021–2022. The descriptive characteristics of these participants are shown in Additional file Table 1. Overall, this subpopulation with a longer follow-up was very similar to the original population. The 24,405 participants included in this analysis had on average, 28.8 days (SD 49.9) of SA, 4.4 (SD 4.7) short episodes, and 0.6 (SD 1.1) long episodes during the two years. We observed higher incidence rate ratios of SA on all SA measures for intermediate SES (days: IRR=1.33, 95% CI 1.12–1.58; short episodes: 1.40, 1.25–1.57; long episodes: 1.35, 1.09–1.67) and high SES (days: IRR=1.16, 95% CI 1.02–1.33; short episodes: 1.19, 1.08–1.31; long episodes: 1.25, 1.03–1.51). For low SES there was a higher incidence rate ratio of SA for short sickness absence episodes (IRR 1.21, 95% CI 1.06–1.39).

Figure 2 presents the adjusted mean of sickness absence days and episodes per person-year averaged into a one-year follow-up stratified by SES in the subpopulation with SA follow-up for 2021–2022. Again, participants reporting COVID-19 infection and with low SES had the highest mean of sickness absence irrespective of measure and again the absolute difference between those

Table 1 Descriptive characteristics of participants by socioeconomic status for follow-up to 2021

	High SES (*N* = 16722)		Intermediate SES (*N* = 8671)		Low SES (*N* = 6731)		Total (*N* = 32124)		
	N	**%**	***N***	**%**	***N***	**%**	***N***	**%**	***P* for difference**
COVID-19 infection self-reported									
Yes	508	3.0	337	3.9	242	3.6	1087	3.4	
No	16,214	97.0	8334	96.1	6489	96.4	31,037	96.6	0.001
COVID-19 infection laboratory confirmed									
Yes	58	0.5	87	1.0	111	1.7	256	0.8	
No	16,664	99.5	8584	99.0	6620	98.3	31,868	99.2	< 0.001
Sex									
Men	3706	22.2	1980	22.8	1746	25.9	7432	23.1	
Women	13,016	77.8	6691	77.2	4985	74.1	24,692	76.9	< 0.001
Job contract									
Permanent	13,251	79.2	7633	88.0	6168	91.6	27,052	84.2	
Fixed term	3471	20.8	1038	12.0	563	8.4	5072	15.8	< 0.001
Working time mode									
Full-time	16,607	99.3	8563	98.8	6633	98.5	31,803	99.0	
Part-time	115	0.7	108	1.2	98	1.5	321	1.0	< 0.001
Working from home									
No	5582	33.4	5331	61.5	6268	93.1	17,181	53.5	
Yes	11,140	66.6	3340	38.5	463	6.9	14,943	46.5	< 0.001
Smoking									
Never smoked	12,896	77.1	5232	60.3	3701	55.0	21,829	68.0	
Quit smoking	2804	16.8	2129	24.6	1676	24.9	6609	20.5	
Current smoker	1022	6.1	1310	15.1	1354	20.1	3686	11.5	< 0.001
Alcohol consumption									
No	2981	17.8	2003	23.1	1992	29.6	6976	21.7	
Moderate	12,934	77.4	6307	72.7	4498	66.8	23,739	73.9	
Heavy	807	4.8	361	4.2	241	3.6	1409	4.4	< 0.001
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Age	46.5	10.4	46.4	11.1	45.5	11.6	46.3	10.9	< 0.001
Body Mass Index	25.8	4.6	27.0	5.2	27.1	5.2	26.4	4.9	< 0.001
Daily MET-hours*	5.9	4.5	5.3	4.5	5.3	4.8	5.6	4.6	< 0.001
Sickness absence days per person-month in 2019	0.82	1.96	1.26	2.73	1.42	2.60	1.09	2.3	< 0.001
Sickness absence days in 2021	9.9	24.5	14.4	31.9	19.9	36.6	13.2	29.7	< 0.001
Sickness absence spells 1–9 days in 2021	1.6	2.8	2.0	2.5	2.7	3.1	1.9	2.5	< 0.001
Sickness absence spells over 10 days in 2021	0.2	5.8	0.3	0.7	0.4	0.8	0.2	0.7	< 0.001

SES = socioeconomic status, SD = standard deviation, *metabolic equivalent task (MET) hours per day

reporting COVID-19 infection and those not, was largest for participants with intermediate SES (difference 0.5 days, 0.08 short episodes, 0.09 long episodes).

In the sensitivity analysis with self-reported laboratory confirmed COVID-19 infection in 2020 (0.8%) with SA in 2021 incidence rate ratios were found for intermediate (IRR 1.41, 95% CI 1.10–1.80) and low SES (IRR 1.37, 95% CI 1.10–1.70) for short episodes of SA (Additional file Table A2) compared to those not reporting a laboratory confirmed COVID-19 infection. No associations were found for total days or longer absence nor for high SES in any SA measure.

Discussion

We found higher levels of sickness absence in 2021 for employees who reported a COVID-19 infection in 2020. The association was robust for controlling for individual and lifestyle-related characteristics and level of sickness absence prior to the COVID-19 pandemic and could be observed also for laboratory confirmed COVID-19 infection and in a subsample where there was follow-up also for 2022. Possible explanations for the associations could be the long-term physiological changes related to the initial COVID-19 infection referred as long COVID, increased susceptibility to other diseases, associations with mental and behavioral health, and changes in sickness absence behavior, for example a lower threshold to stay at home with mild symptoms. The association

Table 2 The adjusted* association between COVID-19 infection in 2020 and sickness absence in 2021 stratified by socioeconomic status ($N=32124$). Reference = no COVID-19 infection in 2020

	COVID-19 infection case in 2020		**SA days in 2021**		**Short SA episodes in 2021**		**Long SA episodes in 2021**		**Sickness absence days in 2021**		**Number of short sickness absence episodes in 2021**		**Number of long sickness absence episodes in 2021**	
	N	%	MD	Q1, Q3	MD	Q1, Q3	MD	Q1, Q3	IRR	95% CI	IRR	95% CI	IRR	95% CI
High SES ($n=16722$)	508	3	2	0, 9	1	0, 2	0	0, 0	1.09	0.93–1.28	**1.23**	**1.11–1.37**	1.11	0.89–1.39
Intermediate SES ($n=8671$)	337	4	4	0, 15	1	0, 3	0	0, 0	**1.45**	**1.20–1.77**	**1.42**	**1.26–1.61**	**1.30**	**1.03–1.64**
Low SES ($n=6731$)	242	4	8	2, 22	2	1, 4	0	0, 1	1.20	0.95–1.51	**1.21**	**1.05–1.41**	1.19	0.92–1.53
P for SES*COVID-19 interaction										0.08		0.14		0.61

SES = socioeconomic status, SA = sickness absence, MD = median, Q = quartile, IRR = incidence rate ratio, CI = confidence interval

*adjusted for age, sex, working time mode, job contract, working from home, smoking, alcohol consumption, body mass index, daily exercise, and sickness absence in 2019

between COVID-19 and future sickness absence was also slightly more pronounced and more consistent in the employees with intermediate socioeconomic status, such as registered nurses. This could be related to differences in workplace practices in different occupations, such as possibilities for remote work.

Long COVID is a multisystemic condition that follows a severe acute COVID-19 infection [19]. Individuals with long COVID experience many different symptoms across multiple organ systems and the severity of these in many cases makes them unable to work [20]. It is estimated that 6.2% of symptomatic COVID-19 survivors show symptomology related to long COVID 3 months after the infection [21]. Recently a cumulative global incidence of long COVID by the end of 2023 was estimated to be approximately 400 million cases [22]. We found no definite figures on long COVID and sickness absence yet possibly because the registration of the cases may vary but there are estimates that the number of workdays lost due to long COVID is substantial [23]. A British study found that having COVID-19 was associated with several subsequent other diseases such as chronic respiratory failure, cardiac arrythmia, peripheral neuropathy, diabetes, and anxiety [24]. It is unlikely that there would be physiological susceptibilities that could explain the socioeconomic difference we found between occupational levels. However, it is possible that in certain occupations, e.g. in health care, the psychological impact of COVID-19 was greater due to perceived risk of infection and increased workload. The occupational differences in the personal experience of the pandemic and its associations on future morbidity should be studied in more detail.

Studies have observed changes in the eating habits and alcohol consumption of the general population during and after the COVID-19 pandemic [25]. However, it is not clear whether the dietary choices of those who have had a COVID-19 infection differ significantly from the general population [26]. There have been differing trends on the prevalence of smoking in different demographic groups after the COVID-19 pandemic and there is some indication that the overall decline has stagnated in the general population [2]. Again, it is not clear how those who have had a COVID-19 infection differ from the general population in their smoking habits.

Workplace attitudes and policies have been shown to impact the extent to which employees stay at home when experiencing symptoms or come to work while sick during the COVID-19 pandemic [27]. Employees who have had COVID-19 may be even more careful when considering going to work when experiencing symptoms. This difference could be more pronounced in workplaces where the risk of infecting others could be greater, e.g. in health care, or in schools. Workplace policies may be one reason why the association between COVID-19 and

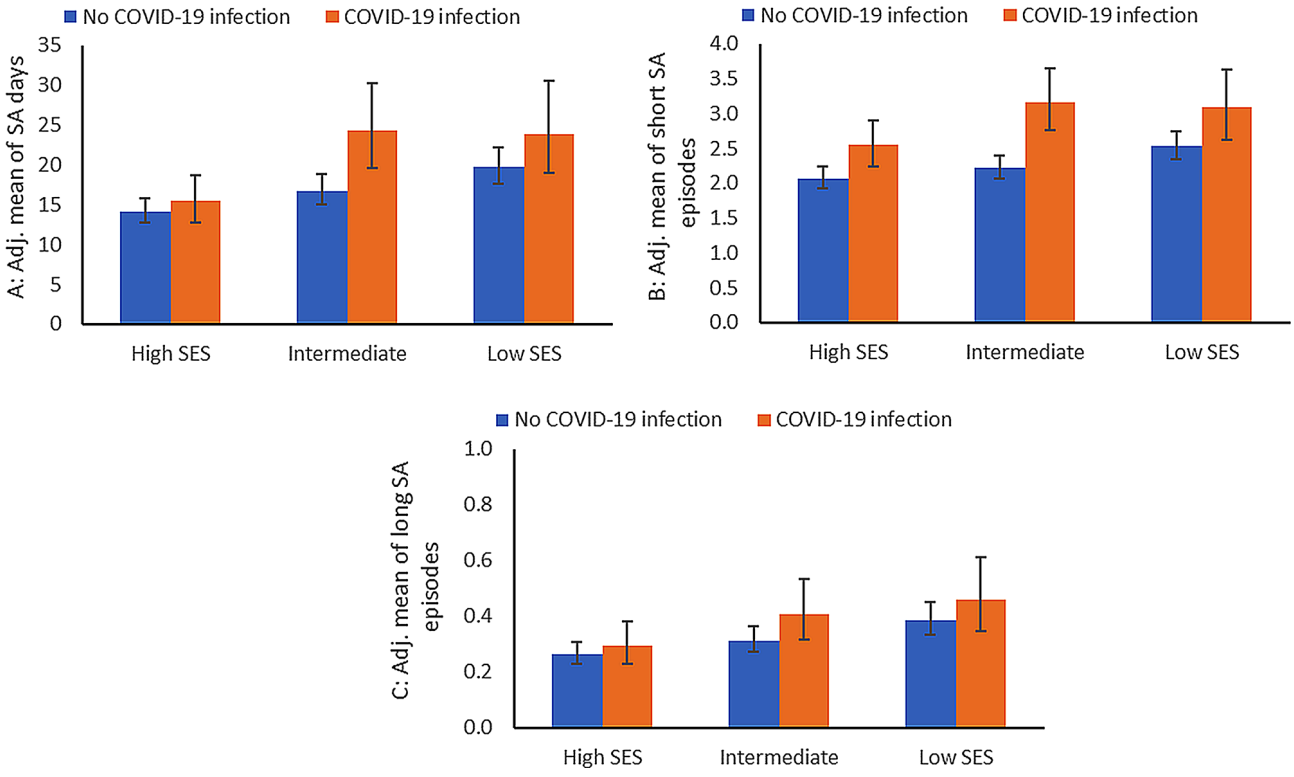

Fig. 1 Absolute differences (covariate-adjusted means) in **A**) sickness absence days **B**) short sickness absence episodes **C**) long sickness absence episodes per person-year in 2021 in those with and without COVID-19 infection in 2020 stratified by socioeconomic status (SES). Error bars indicate 95% confidence intervals

Table 3 The adjusted* association between COVID-19 infection in 2020 and sickness absence in 2021–2022 stratified by socioeconomic status ($N = 24405$). Reference = no COVID-19 infection in 2020

	Sickness absence days in 2021–2022		**Number of short sickness absence episodes in 2021–2022**		**Number of long sickness absence episodes in 2021–2022**	
	IRR	95% CI	IRR	95% CI	IRR	95% CI
High SES	1.06	0.93–1.22	**1.12**	**1.02–1.23**	1.13	0.93–1.37
Intermediate SES	**1.42**	**1.20–1.69**	**1.36**	**1.22–1.52**	**1.37**	**1.11–1.68**
Low SES	1.13	0.93–1.21	**1.25**	**1.09–1.42**	1.24	0.98–1.57
P for SES*COVID-19 interaction		**0.02**		**0.03**		0.43

SES = socioeconomic status, SA = sickness absence, IRR = incidence rate ratio, CI = confidence interval

*adjusted for age, sex, working time mode, working from home, job contract, smoking, alcohol consumption, body mass index, daily exercise, and sickness absence in 2019

sickness absence was more pronounced in the intermediate socioeconomic group. Remote work increased in many sectors of work during the pandemic [6]. However, in many occupations remote work is not possible and these are often the same occupations where there was a higher risk for exposure to COVID-19. We used information on whether the participant was transferred to work from home during the pandemic as a measure whether it is possible do remote work in that job. Adjusting for this variable did not affect the results significantly. However, we do not know what the workplace policies regarding remote work are currently, and could they influence sickness absences. Possibilities for remote work also correlate with occupational levels, and therefore associations between socioeconomic status, sickness absence and remote work are hard to entangle.

There have been calls to examine the burden of COVID-19 in terms of costs for the individuals and for the society, and especially in those occupations where there was increased exposure to and incidence of

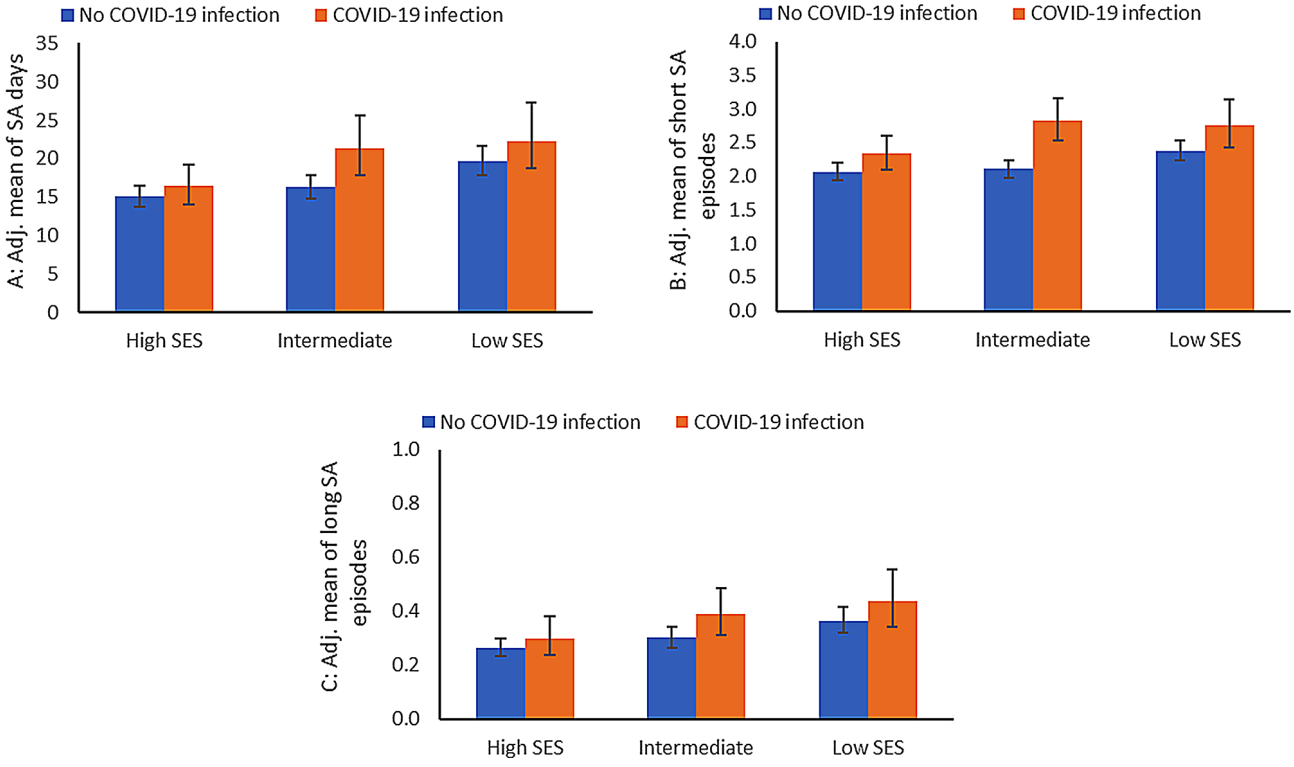

Fig. 2 Absolute differences (covariate-adjusted means) in **A**) sickness absence days **B**) short sickness absence episodes **C**) long sickness absence episodes in 2021–2022 per person-year averaged into a one-year follow-up in those with and without COVID-19 infection in 2020 stratified by socioeconomic status (SES). Error bars indicate 95% confidence intervals

COVID-19 [10, 27–29]. Our results suggest that sickness absence is a relevant issue that should be examined as a long-term health and economic consequence of COVID-19 from the individual, workplace, and societal perspective. On average employees who had experienced a COVID-19 infection had 3.6 days more sickness absences in a year. In an organization with 5000 full-time employees (a medium-sized city), and with 3% prevalence of first-wave COVID-19 infections, this would sum up to 540 additional sickness absence days. It is important for employers and occupational health services to be aware of the potential higher future rates of sickness absences for those who experienced COVID-19 during the initial wave of the pandemic. They could benefit from long-term vocational support to maintain their work ability [10]. Employer policies regarding sick leaves could also be evaluated to ensure that they correspond to the current guidelines regarding infectious diseases and help employees to evaluate their situation adequately.

Strengths and limitations

This is a prospective study, where we had a large study population of employees in the public sector. We had reliable information on all sickness absence from the employers' registers before and after the COVID-19 pandemic. We could adjust for several relevant confounders related to the job situation and personal characteristics of the employees.

However, we did not have diagnosis-specific information on sickness absence. We did not have objective data on COVID-19 infection. The measurement of COVID-19 was based on a self-report of own or a doctor's evaluation of COVID-19, or on a self-reported laboratory test confirmed case, which could lead to under- or overreporting. During the pandemic not all suspected cases were tested and therefore there are no comprehensive records of COVID-19 infections in Finland where objective information could be retrieved for all cases. Furthermore, the information of the COVID-19 infection was from one time point in 2020 and exposure during the follow-up could have diluted the results. Also, the association could be due an unobserved time trend, or another unmeasured factor correlated with both the likelihood of infection and sickness absence, and the results cannot be interpreted causally. The study population was limited to municipal sector employees. Our cohort with 77% of women is very consistent with the overall employee population of the municipal sector, where in 2022, 80% of employees were women. Despite female-dominated cohort, we still had a substantial number of men ($n=7432$). However, the generalizability to the general working population or other sector of work or industry is uncertain.

Conclusions

Having had a COVID-19 infection during the first wave of the pandemic in 2020 was associated with a higher number of sickness absence in the following two years. There were socioeconomic differences suggesting that those occupations with higher occupational exposure to COVID-19 may have higher rates of sickness absences even after the pandemic.

Abbreviations

BMI	Body mass index
CI	Confidence interval
COVID-19	Coronavirus disease 2019
FPS	Finnish Public Sector Study
IRR	Incidence Rate Ratio
ISCO	International Standard Classification of Occupations
MD	Median
MET	Metabolic equivalent task
Q	Quartile
SA	Sickness absence
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SD	Standard deviation
SES	Socioeconomic status

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-024-21148-7.

Supplementary Material 1

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Not applicable.

Author contributions

MJ and JE planned the study design. MJ drafted the paper. JE was responsible for the study funding. JE, JA and MJ are responsible for the data and statistical analyses. All authors (MJ, JK, JA, TO, JV, MK and JE) provided critical interpretation of the data and revised the manuscript.

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Data availability

The datasets generated and analysed during the current study are not publicly available due to national legislation, but anonymised data are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The Ethical Committee of the Helsinki and Uusimaa hospital approved the FPS study (HUS/1210/2016). In the FPS study informed consent is received from the participant by informing them in the cover letter of the questionnaire that the responses would be used in scientific research and answering the questionnaire is voluntary and if one does not wish to participate in the study, to ignore the questionnaire or notify the researchers of refusal. At the end of the questionnaire, a specific informed consent is asked to link survey data with register data. The full questionnaire guide to the participants describing informed consent can be found online at: https://www.ttl.fi/en/tutkimus/hankkeet/kunta-ja-hyvinvointialan-henkiloston-seurantatutkimus-fps/kunta10-tiedote-tutkittavalle.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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