

Problem drinking and comorbidity with mental ill health: a cross-sectional study among healthcare workers in Sweden

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Abstract

Aims: Problem drinking in healthcare workers (HCWs) is highly relevant to study as it could result in personal suffering, as well as inefficiencies in health service delivery. This study aims to investigate the prevalence of nondrinking, drinking, and problem drinking and to investigate the comorbidity between drinking alcohol and mental illness (burnout and depression) among HCWs in Sweden.

Methods: This cross-sectional study draws on the 2022 Longitudinal Occupational Health survey in Healthcare Sweden of physicians, nurses, and nurse assistants in Sweden ($N=5966$). Measures include levels of alcohol use assessed by the Cut, Annoyed, Guilty, and Eye Opener questionnaire, the 12-item Burnout Assessment Tool, and the Symptom Checklist–Core Depression. Multinomial Logistic regressions were used to investigate the likelihood of reporting nondrinking and problem drinking compared to drinking.

Results: The prevalence of problem drinking among Swedish HCWs was 3.7%. Only sex differences were observed for those with a problem drinking, with male nurses and nurse assistants being more likely to report problem drinking. Comorbidity was found between problem drinking and depression but not between problem drinking and burnout.

Conclusions: This study demonstrated that ~3.7% of Swedish HCWs had problem drinking and that those also had a higher likelihood of reporting depression but not burnout. Results contribute to new knowledge about the use of alcohol and comorbidities with depression and burnout among HCWs in Sweden. Findings could benefit employers in implementing preventive and tailored strategies to preserve the psychosocial well-being of HCWs.

Keywords: problem drinking; healthcare; burnout; depression

Introduction

From a societal perspective, problem drinking, i.e. individuals who consume large amounts of alcohol or occasionally face problems due to drinking but do not have a background of severe physical dependence on alcohol (Walitzer and Connors 1999) by healthcare workers (HCWs), is highly relevant as it could result in poor health and inefficiencies in health service delivery (de Lange *et al.* 2024). The high risk of alcohol consumption can compromise HCWs' practice of medicine, decreasing their performance and influencing their behaviours regarding the quality of care and safety of patients (Searby *et al.* 2024). For the individual HCW, problem drinking can lead to adverse work-related outcomes and behaviours, such as the risk of being injured in the workplace (Borrelli *et al.* 2023), mental health problems (Tao *et al.* 2023), and increased sickness absence, all of which can also pose subsequent adverse consequences for the quality of care and patient safety (de Lange *et al.* 2024).

Studies show that HCWs working in demanding work environments, which many do (Gynning *et al.* 2024), may use alcohol as a coping strategy (Ross *et al.* 2018; Halsall *et al.* 2023). Recent studies show that the pooled prevalence of harmful alcohol use among HCWs was 3.2% (Halsall *et al.* 2023), although substantial variations exist across countries (Mo *et al.* 2022). For instance, reported prevalence rates include 1.2% among French physicians (Thiebaud *et al.* 2021), 2.3% among Australian physicians (Wijeratne *et al.* 2021), 5.5% among Australian nurses (Searby *et al.* 2023), and 0.7% among American physicians (Foli *et al.* 2021). A recent Swedish study shows that the prevalence of problem drinking in the health and social care sector was 4.7% in 2020, lower than the prevalence among all included workers, which was 6.6% (Thern *et al.* 2024). Another Swedish study conducted prior to the COVID-19 pandemic shows that HCWs had a relatively low rate of hazardous alcohol consumption, i.e. alcohol consumption that confers risk but has not yet

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reached the level of problem drinking, compared to other sectors (Tareq *et al.* 2024).

A recent review shows that the prevalence of alcohol use disorder varies between physicians and other HCWs, including nurses, depending on the type of measurement, indicating the need to further compare the prevalence of problem drinking across different healthcare professions (Waithera *et al.* 2024). Various international studies suggest that male physicians are more likely to report a alcohol misuse compared to female physicians (Rosta and Aasland 2013; Sørensen *et al.* 2016; Mo *et al.* 2022), although a recent systematic review showed that sex did not predict the occurrence of hazardous alcohol use in HCWs (Halsall *et al.* 2023). Other studies revealed a higher percentage of risky consumption among female HCWs (Oreskovich *et al.* 2015; Cedrone *et al.* 2022). Problem drinking in HCWs has also been associated with increased years of service and hours worked (Schluter *et al.* 2012). Lastly, parental responsibilities have also been associated with the use of alcohol among physicians and nurses, and not having children increases the likelihood of drinking problems (Thiebaud *et al.* 2021; Beiter *et al.* 2022). Despite clear evidence of the risks of consuming alcohol, the variation in prevalence across countries, and the variations across care professions and sociodemographic factors, there is still a lack of prevalence studies describing Swedish HCWs' alcohol use and harmful use (Halsall *et al.* 2023).

There is extensive literature that supports that comorbidity between problem drinking and mental ill health exists, i.e. a simultaneous presence of two or more health conditions. For instance, review studies show that alcohol use disorders were higher among those with any common mental disorders compared to those without (Jane-Llopis and Matytsina 2006; Waithera *et al.* 2024). However, findings on this relationship remain inconsistent; for instance, a South African study found no significant univariate correlation between alcohol use disorder and reported depression and anxiety (Mc Magh *et al.* 2023). Considering the high prevalence of mental ill health, i.e. depression and burnout, among HCWs (Brulin *et al.* 2023), comorbidity should be further investigated.

This study aims to investigate the prevalence of self-reported nondrinking, drinking, and problem drinking among HCWs in Sweden and to investigate the comorbidity between problem drinking and mental illness (burnout and depression). Knowledge about the extent of problem drinking, at-risk groups, and comorbidity is needed to design effective interventions to prevent problem drinking among HCWs (Oreskovich *et al.* 2015). Addressing problem drinking within this professional group may contribute to reducing sickness absence, enhancing job performance, and improving overall patient safety. Findings will also be critical for informing workplace policies aimed at promoting HCWs' well-being and ensuring the provision of safe and high-quality healthcare.

Material and Method

Sample and data collection

This cross-sectional study draws on data from the 2022 Longitudinal Occupational Health survey in HealthCare Sweden (LOHHCS). Using stratified random sampling with six geographical strata, a representative sample of 7908 physicians, 7790 nurses, and 7967 nurse assistants were drawn from the Swedish National Occupational based on Swedish Standard Classification of Occupations (SSYK) codes and the National Educational Registers based on degree. Statistics Sweden was

responsible for sampling, questionnaire distribution, and data collection.

Postal invitations to participate in the study, including personal log-in information for a web-based survey, were sent from Statistics Sweden to the study sample. Three reminders were sent by postal mail. A paper version of the survey was included in the second reminder. The response rates were 34.3% ($n = 2712$) for physicians, 37.3% ($n = 2903$) for nurses, and 26.7% ($n = 2043$) for nurse assistants. Statistic Sweden analysed missing data by comparing the characteristics of the responders to the sample and the full population using various national registers and found no systematic differences. According to retirement age, this study restricted the sample to those >68 years. This resulted in an analytical sample of 7589 HCWs (2143 physicians, 2903 nurses, and 2043 nurse assistants).

The Swedish Ethical Review Authority approved the study (2020-06613; 2021-05574-02; 2022-00310-02). Participants were informed about the study's voluntary and anonymous nature and were not compensated for participating.

Measurements

'Problem drinking' was assessed using a modified version of the Cut, Annoyed, Guilty, and Eye Opener (CAGE) questionnaire (Ewing 1984). Problem drinking refers to alcohol consumption that has resulted in problems, detectable at both clinical and subclinical levels by the CAGE questionnaire (Ewing 1984). The respondents were first asked, 'Do you regularly drink alcohol?' with a five-point Likert-type scale ranging from 'never' (1) to 'every day' (5). Those who responded two to five continued to answer the CAGE, which contains four items pertaining to their lifetime drinking experience (i.e. 'Have you ever felt you should cut down on your drinking?'). Each item has a 0 (no) and 1 (yes) score. A CAGE score <2 indicated drinking, and ≥ 2 indicated problem drinking. We then created a variable with three categories: nondrinking, drinking (i.e. use of alcohol that is not harmful), and problem drinking.

Self-perceived 'burnout' was measured using the Burnout Assessment Tool 12 (BAT-12) (Schaufeli *et al.* 2020). Participants were asked to rate statements (e.g. 'When I am at work, I feel mentally exhausted') using a five-point Likert-type scale ranging from 'never' (1) to 'always' (5). Cronbach's alpha for all 12 items was 0.90, indicating high internal consistency. A grand mean score was computed, and a cut-off score of ≥ 2.96 indicated suffering from burnout complaints (Schaufeli *et al.* 2023) (heron burnout).

Self-rated 'depression' was measured using the Symptom Check List-Core Depression 6 (SCL-CD6) (Magnusson Hanson *et al.* 2014). The scale consists of six items regarding symptoms of depression during the last 7 days (i.e. feeling blue/sad, no interest in things, low energy, everything is an effort, worrying too much, and blaming oneself). All the items were rated on a Likert scale ranging from 'Not at all' (0) to 'Extremely' (4). Cronbach's alpha for all six items was 0.91, indicating high internal consistency. The sum score was computed for the overall scale, and a cut-off score was set at 17 points, indicating that individuals with scores of ≥ 17 most probably have major depression (Magnusson Hanson *et al.* 2014).

Confounders

Based on previous research (Waithera *et al.* 2024), sex, age, years of work experience, and family constellation were used

Table 1. Descriptive statistics of nondrinking, drinking, and problem drinking

	Total	Nondrinking	Drinking	Problem drinking
Total <i>n</i> (%)	7392	1448 (19.6)	5672 (76.7)	272 (3.7)
Profession <i>n</i> (%)				
Physicians	2588 (34.7)	394 (15.3)	2085 (81.0)	94 (3.7)
Nurses	2844 (38.1)	490 (17.4)	2218 (78.6)	113 (4.0)
Nurse assistants	2030 (27.2)	564 (28.2)	1369 (68.5)	65 (3.3)
Sex <i>n</i> (%)				
Male	1518 (20.5)	241 (15.9)	1204 (79.5)	73 (4.8)
Female	5874 (79.5)	1207 (20.5)	4468 (76.1)	199 (3.4)
Work experience (years) <i>n</i> (%)				
<5	1150 (15.6)	218 (19.0)	893 (77.7)	39 (3.4)
5–10	1280 (17.4)	290 (22.7)	948 (74.1)	42 (3.3)
10–15	1211 (16.4)	285 (23.5)	876 (72.3)	50 (4.1)
>15	3728 (50.6)	653 (17.5)	2934 (78.7)	141 (3.8)
Partner <i>n</i> (%)				
Yes	6194 (84.0)	1136 (18.3)	4830 (78.0)	228 (3.7)
No	1178 (16.0)	308 (26.1)	826 (70.1)	44 (3.7)
Children living in the home <i>n</i> (%)				
Yes	3562 (49.3)	755 (21.2)	2668 (74.9)	139 (3.9)
No	3659 (50.6)	644 (17.6)	2889 (79.0)	126 (3.4)
Age <i>m</i> (StD)	46.8 (11.9)	46.4 (11.6)	46.8 (12.0)	47.63 (11.2)
Burnout <i>n</i> (%)	501 (6.7)	145 (28.9)	332 (66.3)	24 (4.8)
Depression <i>n</i> (%)	462 (6.3)	126 (27.3)	299 (64.7)	37 (8.0)

Table 2. Mean comparisons for mental ill health for nondrinking, drinking, and problem drinking with *post hoc* Tukey test

	Nondrinking	Drinking	Problem drinking	P-value for difference between Nondrinking and drinking	P-value for difference between nondrinking and problem drinking
Burnout (1–5)	1.99 (.71)	1.89 (0.63)	2.10 (0.65)	<0.001	0.036
Depression (1–24)	6.72 (6.02)	5.83 (5.31)	8.50 (6.04)	<0.001	<0.001

as potential confounders. Data on sex (men and women) and age were retrieved by Statistics Sweden from the Swedish population register. Years of work experience (<5, 5–10, 10–15, >15), having a partner (yes/no), and having children (yes/no), were self-reported.

Data analysis

Descriptive statistics were used to identify the prevalence of nondrinking, drinking, and problem drinking for the total sample across each demographic variable (profession, sex, age, work experience, partner, children) and mental ill health (burnout and depression). Analysis of variance (ANOVA), with a *post hoc* test, was used to assess potential significant differences in the mean level of mental ill health between the three groups nondrinking, drinking, and problem drinking.

Next, multinomial logistic regressions were conducted to test the likelihood of reporting nondrinking, drinking (base category), and problem drinking across professions and demographics. First, simple effect models (crude model) were conducted for each variable. Next, an adjusted model (Model 1) was carried out, including all demographic variables. To test for comorbidity, two models (Models 2 and 3) additionally added burnout and depression, respectively, due to a high correlation between the two variables ($r=0.76$, $P<.001$). Lastly, stratified analyses for Models 2 and 3 per profession were conducted. Results were presented with odds ratios (ORs) and 95% confidence intervals (CIs). Statistical analyses

were performed using the IBM Statistical Package for Social Sciences (SPSS, version 29.0).

Results

Study sample and descriptive statistics

The study sample comprised 34.7% physicians, 38.1% nurses, and 27.2% nurse assistants (Table 1). The mean age for the study sample was 46.8 (SD 11.9), and most respondents were women. Half of the sample had >15 years of professional experience (50.6). While almost all had a partner (84.0%), only about half (49.3%) had children at home.

Prevalence and comorbidity

A fifth of the HCWs had not used alcohol in the last 12 months (nondrinkers), and 3.7% reported a problem drinking (Table 1). Problem drinking was more common among nurses (4.0%), males (4.8%), and those with 10–15 years of experience (3.8%) and children living at home (3.9%).

The ANOVA (Table 2) showed that among HCWs reporting problem drinking, the mean levels of depression ($M=8.50$) and burnout ($M=2.10$) were significantly higher compared to those drinking and not drinking alcohol, while the mean levels among HCWs reporting drinking were the lowest for both depression ($M=5.83$) and burnout ($M=1.89$).

The crude results from multinomial logistic regressions (Table 3) showed that physicians and nurses were less likely to report nondrinking relative to drinking. Comparing nondrinking to drinking, males, those with a partner, depression, and burnout were more likely to report drinking, while HCWs with children living at home were more likely to report nondrinking. Further, HCWs with 5–15 years of work experience were more likely to report nondrinking compared to those with >15 years of work experience. Men, relative to women, were more likely to report problem drinking than drinking. HCWs with scores indicating depression or burnout were less likely to report problem drinking than drinking. No other significant relative differences were observed.

Few changes to the crude results are observed when all demographic variables are jointly added (Model 1). The exceptions are that there is no longer a statistical difference between men's and women's likelihood to report nondrinking relative to drinking ($P = .083$). Lastly, in Models 2 and 3, when burnout and depression were additionally added, both the significance level and OR remained at the same level as in Model 1. One exception was that males were again statistically significantly less likely to report nondrinking relative to drinking when adjusting for burnout and depression, respectively.

Focusing on comorbidity, HCWs reporting burnout, compared to those without burnout, were 70% more likely also to report nondrinking (OR: 1.71, 95% CI: 1.38–2.12) relative to drinking. Meanwhile, no differences in burnout were observed between drinking and problem drinking. Similarly, HCWs reporting depression, compared to those without depression, were more likely to report nondrinking relative to drinking (OR: 1.69, 95% CI: 1.34–2.11) and problem drinking relative to drinking (OR: 2.79, 95% CI: 1.91–4.07).

Sensitivity analysis with nondrinking as the base category showed no significant differences between HCWs reporting burnout relative to no burnout (OR: .85, 95% CI: .53–1.37, $P = .513$). On the other hand, HCWs reporting depression, compared to those who did not, were more likely also to report problem drinking relative to nondrinking (OR: 1.62, 95% CI: 1.08–2.42, $P = .020$).

Lastly, the stratified analyses (Table 4) indicated some demographic variations between the three professions in the levels of use of alcohol. With regard to the differences between professions in the levels of use of alcohol, statistically significant differences between nondrinking and drinking were observed for years of working experience for physicians and nurse assistants but not for nurses and having a partner and children living at home for nurses and nurse assistants but not for physicians. While sex differences in drinking patterns were observed for nurses and nurse assistants, no such differences were observed among physicians. Comorbidity between depression and problem drinking was observed across all professions (physicians OR: 3.52 95% CI: 1.86–6.63; nurses OR: 2.02 95% CI: 1.06–3.84; nurse assistants OR: 2.96 95% CI: 1.44–6.08).

Discussion

This cross-sectional study used a large representative sample of Swedish HCWs (physicians, nurses, and nurse assistants) to investigate prevalences of nondrinking, drinking, and problem drinking, as well as potential comorbidity between the use of alcohol and burnout and depression, respectively. The prevalence of problem drinking among Swedish HCWs

was 3.7%, with variations across subgroups of HCW. A fifth of the HCWs reported not drinking alcohol. Also, we found comorbidity between problem drinking and depression but not between problem drinking and burnout. In this discussion, we will focus on the results concerning drinking problems.

The prevalence of problem drinking found in this study is somewhat higher than for HCWs in other countries (Foli *et al.* 2021; Thiebaud *et al.* 2021; Wijeratne *et al.* 2021; Mo *et al.* 2022) but lower than the general working population in Sweden and workers in the Swedish health and social care sector (Tareq *et al.* 2024). While demographic differences in prevalence were observed for those who did not drink alcohol, only sex differences were observed for those with problem drinking, with males at high risk of reporting problem drinking. The study results contrast a recent systematic review, which showed that sex did not predict hazardous alcohol use in HCWs (Halsall *et al.* 2023) but aligns with another Swedish study showing that men report higher prevalences of problem drinking (Tareq *et al.* 2024). Further, our results indicated that sex differences occurred only among nurses and nurse assistants, two female-dominated occupations, and not for physicians with a balanced sex distribution. The nonsignificant sex differences for physicians do not align with previous results reporting that the harmful use of alcohol is more common in male physicians compared to females (Rosta and Aasland 2013; Mo *et al.* 2022; Tao *et al.* 2023). Differences in the prevalence of various aspects of harmful alcohol use across studies may be due to country contexts but also different measurements have been used (Waithera *et al.* 2024).

Although the highest mean level of burnout and depression was found among those HCWs reporting problem drinking, comorbidity seemed to only exist between depression and problem drinking when adjusting for other variables. Our results differ from a previous review (Rosta and Aasland 2013) but align with a study showing that physicians with depressive symptoms were more likely to report alcohol dependence (Oreskovich *et al.* 2015). Furthermore, both burnout and depression, and especially burnout, were more common among HCWs who reported not drinking alcohol. Taken together, more longitudinal research is needed to disentangle how burnout and depression, respectively, are associated with the use of alcohol.

Our results should be viewed against the backdrop that they were collected in 2022, shortly after the COVID-19 pandemic. Research indicates that the prevalence of harmful alcohol use has increased during the pandemic (Beiter *et al.* 2022). Also, the COVID-19 pandemic exposed HCWs to high workloads and stress, with global evidence demonstrating an increase in alcohol consumption (Arble *et al.* 2023; Halsall *et al.* 2023). Although some HCWs may have increased their alcohol drinking during this period in a responsible manner, the combination of increased emotional distress and substance use is potentially critical (Choflet *et al.* 2021) and fatal for frontline healthcare professionals (Gossop 2001) and needs sudden attention.

Problem drinking among HCWs is of concern as it can impair their health, performance, professional conduct, cognitive function, and decision-making, potentially leading to medical errors and poor patient safety (Kilian *et al.* 2021; Mc Magh *et al.* 2023). While we recommend further longitudinal studies confirming the associations between problem drinking among HCWs and quality of care, actions are needed to reduce problem drinking and mental ill health in HCWs.

Table 4. Stratified multinomial logistic regression analysis for physicians, nurses, and nurse assistants for nondrinking, drinking, and problem drinking. Adjusted models

	Physicians						Nurses						Nurse assistants							
	95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI		95% CI			
	OR	Lower	Upper	Sig.	OR	Lower	Upper	Sig.	OR	Lower	Upper	Sig.	OR	Lower	Upper	Sig.	OR	Lower	Upper	Sig.
Burnout																				
Nondrinking ^a	0.82	0.65	1.03	0.091	0.68	0.47	0.99	0.042	1.10	0.75	1.64	0.605	1.02	1.01	1.02	0.884	1.01	0.99	1.02	0.375
Age																				
Years of working experience																				
<5	1.75	1.03	2.97	0.038	1.26	0.82	1.94	0.288	1.71	1.09	2.69	0.020	1.76	1.14	2.73	0.012	1.36	0.93	2.00	0.026
5-10	1.65	1.13	2.42	0.010	1.31	0.94	1.81	0.108	1.82	1.33	2.49	<0.001	1.65	1.13	2.42	0.010	1.31	0.94	1.81	<0.001
10-15																				
>15																				
Partner (ref no partner)	0.51	0.37	0.70	<0.001	0.61	0.47	0.80	<0.001	0.72	0.55	0.93	0.011	1.19	0.92	1.54	0.186	1.47	1.17	1.84	2.36
Children living at home (ref no children)	1.19	0.92	1.54	0.002	1.60	1.08	2.35	0.019	1.68	1.17	2.40	0.005	1.78	1.23	2.56	0.002	1.60	1.08	2.35	0.005
Burnout	1.21	0.79	1.86	0.387	1.74	1.03	3.00	0.040	2.23	1.05	4.74	0.037	1.04	1.01	1.08	0.013	1.02	0.99	1.05	0.438
Male (ref female)																				
Age																				
Years of working experience																				
<5	1.82	0.67	4.92	0.240	1.62	0.74	3.52	0.225	0.66	0.17	2.49	0.536	1.35	0.57	3.19	0.496	0.68	0.29	1.60	0.286
5-10	1.85	0.93	3.67	0.078	1.33	0.72	2.44	0.361	0.92	0.38	2.22	0.850	1.08	0.93	1.25	0.865	1.64	0.77	3.53	0.114
10-15																				
>15																				
Partner (ref no partner)	0.92	0.46	1.86	0.820	0.84	0.49	1.46	0.541	0.71	0.38	1.31	0.268	1.16	0.71	1.89	0.55	1.54	1.00	2.39	0.736
Children living at home (ref no children)	1.08	0.46	2.52	0.865	1.64	0.77	3.53	0.201	1.90	0.86	4.19	0.114	1.08	1.01	1.08	0.013	1.02	0.99	1.05	0.438
Burnout																				
-2 Log likelihood	947.942 (<i>P</i> < .001)																			
95% CI	1079.050 (<i>P</i> < .001)																			
Depression																				
Nondrinking ^a	0.87	0.68	1.12	0.281	0.69	0.46	1.04	0.074	0.99	0.64	1.53	0.950	1.02	1.01	1.02	0.521	1.01	0.99	1.02	0.323
Age																				
Years of working experience																				
<5	1.94	1.10	3.42	0.021	1.22	0.78	1.92	0.388	1.98	1.23	3.17	0.005	1.84	1.15	2.95	0.011	1.38	0.91	2.03	0.079
5-10	1.87	1.25	2.80	0.002	1.30	0.92	1.84	0.138	1.88	1.34	2.64	<0.001	1.81	1.18	2.77	0.007	1.65	1.15	2.38	0.026
10-15																				
>15																				
Partner (ref no partner)	0.49	0.35	0.68	<0.001	0.61	0.46	0.81	<0.001	0.68	0.52	0.88	0.004	1.20	0.91	1.59	0.195	1.34	1.06	1.70	<0.001
Children living at home (no children)	1.81	1.18	2.77	0.007	1.65	1.15	2.38	0.007	1.57	1.06	2.35	0.026	1.30	0.92	1.84	0.002	1.30	0.92	1.84	0.002
Depression																				
Male (ref female)																				
Age																				
Years of working experience																				
<5	1.30	0.84	2.02	0.237	1.73	0.99	3.03	0.056	2.47	1.15	5.30	0.021	1.04	1.01	1.08	0.020	1.03	1.00	1.06	0.918
5-10	1.76	0.62	5.00	0.286	1.74	0.80	3.79	0.162	0.72	0.19	2.77	0.636	1.52	0.63	3.64	0.352	0.72	0.31	1.71	0.309
10-15	1.97	0.97	3.99	0.059	1.42	0.77	2.61	0.262	0.97	0.40	2.35	0.945	1.11	0.53	2.32	0.791	0.84	0.48	1.46	0.491
>15																				
Partner (ref no partner)	1.12	0.67	1.85	0.674	1.57	1.01	2.44	0.047	1.10	0.61	1.98	0.760	3.52	1.86	6.63	<0.001	2.02	1.06	3.84	0.003
Children living at home (no children)	896.051	1516.582 (<i>P</i> < .001)																		
Depression																				
-2 Log likelihood	896.051 (<i>P</i> < .001)																			
95% CI	1516.582 (<i>P</i> < .001)																			

^aDrinking was the base category.

Strengths and limitations

The strengths of the study are the use of validated tools to assess problem drinking, burnout, and depression and the large sample size, representing the Swedish population of HCW studied. However, the study has some limitations that should be considered when interpreting the results. First, the outcomes are based on self-reports of our study variables (alcohol use, burnout, and depression). Recall bias could occur, and underreporting may be more common than overreporting in samples of HCWs. The stigma associated with drinking problems (Hyman *et al.* 2017), social desirability and underestimation of alcohol use might impact the reporting of alcohol use (McCusker *et al.* 2002). Second, this study was based on cross-sectional survey data, which cannot infer causal relationships between exposure and outcome variables.

Lastly, there exist several instruments that measure alcohol use in different ways. We chose the CAGE because we wanted a short, feasible, and validated instrument to measure alcohol use as a drinking problem (Dhalla and Kopec 2007). The modified version of CAGE has been used in other Swedish Studies and is therefore valuable to use for comparability (Tareq *et al.* 2024). The CAGE instrument has received critique as it includes lifetime use of alcohol (Dhalla and Kopec 2007). In the LOHHCS survey, respondents are first asked to indicate how often they drank alcohol in the last 12 months. Those reporting that they had been drinking for the last 12 months were asked to answer the CAGE question, limiting the risk that the problem of drinking occurred years ago. Moreover, although a CAGE score of ≥ 2 is conventionally used to identify alcohol-related issues, some researchers have suggested employing a score of ≥ 1 for general screening purposes, arguing that this would increase the tool's sensitivity and enhance the detection of early-stage cases (Castells and Furlanetto 2005). However, a meta-analysis of CAGE studies concluded that a cut-off of 1 significantly diminishes the tool's specificity, thereby increasing the risk of false positives (Aertgeerts *et al.* 2004). We, therefore, used ≥ 2 as the cut-off.

Conclusions

This study demonstrated that $\sim 3.7\%$ of Swedish HCWs reported problem drinking and that those also had a higher likelihood of reporting depression but not burnout. Male HCWs were more likely than females to report problem drinking. Although not higher than in the general population, it is imperative to prevent problem drinking among HCWs as it may cause great personal suffering and poor patient safety.

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Author contributions

J.P.Z. and E.B. conceived and designed the study, were responsible for data management and statistical analysis, and drafted the initial manuscript. All authors contributed to manuscript revisions. All authors read and approved the final manuscript.

Conflict of interest: None declared.

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Data availability

The datasets analysed during the current study are not publicly available due to ethical regulations, but aggregated data are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

The study was approved by the Swedish Ethical Review Authority (2020-06613; 2021-05574-02; 2022-00310-02). Participants were informed about the study's voluntary and anonymous nature. They were not compensated for participating.

Consent for publication

Not applicable.

References

- Aertgeerts B, Buntinx F, Kester A. The value of the CAGE in screening for alcohol abuse and alcohol dependence in general clinical populations: a diagnostic meta-analysis *J Clin Epidemiol.* 2004;57:30–9. [https://doi.org/10.1016/S0895-4356\(03\)00254-3](https://doi.org/10.1016/S0895-4356(03)00254-3).
- Arble E, Manning D, Arnetz BB. *et al.* Increased substance use among nurses during the COVID-19 pandemic *Int J Environ Res Public Health.* 2023;20:2674. <https://doi.org/10.3390/ijerph20032674>.
- Beiter KJ, Wiedemann RP, Thomas CL. *et al.* Alcohol consumption and COVID-19-related stress among health care workers: the need for continued stress-management interventions *Public Health Rep.* 2022;137:326–35. <https://doi.org/10.1177/00333549211058176>.
- Borrelli I, Gualano MR, Rossi MF. *et al.* Alcohol consumption in health-care workers and risk of workplace injury: a case-control study *Dis-cov Sustain.* 2023;4. <https://doi.org/10.1007/s43621-023-00137-7>.
- Brunlin E, Lidwall U, Seing I. *et al.* Healthcare in distress: a survey of mental health problems and the role of gender among nurses and physicians in Sweden *J Affect Disord.* 2023;339:104–10. <https://doi.org/10.1016/j.jad.2023.07.042>.
- Castells MA, Furlanetto LM. Validity of the CAGE questionnaire for screening alcohol-dependent inpatients on hospital wards *Braz J Psychiatry.* 2005;27:54–7. <https://doi.org/10.1590/S1516-44462005000100012>.
- Cedrone F, Buomprisco G, Nicola M. *et al.* Alcohol use during COVID-19 pandemic: a cross-sectional survey among healthcare and office workers in Italy *Int J Environ Res Public Health.* 2022;19:12587. <https://doi.org/10.3390/ijerph191912587>.
- Choflet A, Davidson J, Lee KC. *et al.* A comparative analysis of the substance use and mental health characteristics of nurses who complete suicide *J Clin Nurs.* 2021;30:1963–72. <https://doi.org/10.1111/jocn.15749>.
- de Lange H, Løvseth LT, Christensen M. *et al.* Editorial: healthy healthcare: opportunities and pitfalls of designing and conducting research and practice in healthcare settings? *Front Psychol.* 2024;15. <https://doi.org/10.3389/fpsyg.2024.1514074>.
- Dhalla S, Kopec JA. The CAGE questionnaire for alcohol misuse: a review of reliability and validity studies *Clin Invest Med.* 2007;30:33–41. <https://doi.org/10.25011/cim.v30i1.447>.
- Ewing JA. Detecting alcoholism: the CAGE questionnaire *JAMA.* 1984;252:1905. <https://doi.org/10.1001/jama.1984.03350140051025>.
- Foli KJ, Forster A, Cheng C. *et al.* Voices from the COVID-19 frontline: nurses' trauma and coping *J Adv Nurs.* 2021;77:3853–66. <https://doi.org/10.1111/jan.14988>.
- Gossop M. Health care professionals referred for treatment of alcohol and drug problems *Alcohol Alcohol.* 2001;36:160–4. <https://doi.org/10.1093/alcalc/36.2.160>.
- Gynning BE, Karlsson E, Teoh K. *et al.* Contextualising the job demands-resources model: a cross-sectional study of the psychosocial work environment across different healthcare professions *Hum Resour Health.* 2024;22:77. <https://doi.org/10.1186/s12960-024-00958-1>.

- Halsall L, Irizar P, Burton S. *et al.* Hazardous, harmful, and dependent alcohol use in healthcare professionals: a systematic review and meta-analysis *Front Public Health*. 2023;11. <https://doi.org/10.3389/fpubh.2023.1304468>.
- Hyman SA, Shotwell MS, Michaels DR. *et al.* A survey evaluating burnout, health status, depression, reported alcohol and substance use, and social support of anesthesiologists *Anesth Analg*. 2017;125:2009–18. <https://doi.org/10.1213/ane.0000000000002298>.
- Jane-Llopis E, Matytsina I. Mental health and alcohol, drugs and tobacco: a review of the comorbidity between mental disorders and the use of alcohol, tobacco and illicit drugs *Drug Alcohol Rev*. 2006;25:515–36. <https://doi.org/10.1080/09595230600944461>.
- Kilian C, Manthey J, Carr S. *et al.* Stigmatization of people with alcohol use disorders: an updated systematic review of population studies *Alcohol Clin Exp Res*. 2021;45:899–911. <https://doi.org/10.1111/acer.14598>.
- Magnusson Hanson LL, Westerlund H, Leineweber C. *et al.* The symptom Checklist-core depression (SCL-CD6) scale: psychometric properties of a brief six item scale for the assessment of depression *Scand J Public Health*. 2014;42:82–8. <https://doi.org/10.1177/1403494813500591>.
- Mc Magh C, Fadahun O, Francis JM. Prevalence and correlates of alcohol use, mental disorders, and awareness and utilization of support services among healthcare professionals in west Rand District, Gauteng, South Africa: a cross-sectional study *Fam Pract*. 2023;42. <https://doi.org/10.1093/fampra/cmada094>.
- McCusker MT, Basquille J, Khwaja M. *et al.* Hazardous and harmful drinking: a comparison of the AUDIT and CAGE screening questionnaires *QJM*. 2002;95:591–5. <https://doi.org/10.1093/qjmed/95.9.591>.
- Mo D, Min K, Gluck R. *et al.* Alcohol use and misuse among Chinese psychiatrists during the early COVID-19 pandemic *Front Psych*. 2022;13. <https://doi.org/10.3389/fpsy.2022.933814>.
- Oreskovich MR, Shanafelt T, Dyrbye LN. *et al.* The prevalence of substance use disorders in American physicians: the prevalence of substance use disorders in American *Am J Addict*. 2015;24:30–8. <https://doi.org/10.1111/ajad.12173>.
- Ross CA, Berry NS, Smye V. *et al.* A critical review of knowledge on nurses with problematic substance use: the need to move from individual blame to awareness of structural factors *Nurs Inq*. 2018;25:e12215. <https://doi.org/10.1111/nin.12215>.
- Rosta J, Aasland OG. Changes in alcohol drinking patterns and their consequences among Norwegian doctors from 2000 to 2010: a longitudinal study based on national samples *Alcohol Alcohol*. 2013;48:99–106. <https://doi.org/10.1093/alcal/ags084>.
- Schaufeli WB, Desart S, De Witte H. Burnout assessment tool (BAT)—development, validity, and reliability *Int J Environ Res Public Health*. 2020;17:9495. <https://doi.org/10.3390/ijerph17249495>.
- Schaufeli WB, De Witte H, Hakanen JJ. *et al.* How to assess severe burnout? Cutoff points for the burnout assessment tool (BAT) based on three European samples *Scand J Work Environ Health*. 2023;49:293–302. <https://doi.org/10.5271/sjweh.4093>.
- Schluter PJ, Turner C, Benerfer C. Long working hours and alcohol risk among Australian and New Zealand nurses and midwives: a cross-sectional study *Int J Nurs Stud*. 2012;49:701–9. <https://doi.org/10.1016/j.ijnurstu.2012.01.005>.
- Searby A, Burr D, Taylor G. *et al.* Alcohol consumption among Australian nurses: a cross-sectional national survey study *Collegian*. 2023;30:440–8. <https://doi.org/10.1016/j.colegn.2022.12.004>.
- Searby A, Burr D, Redley B. The impact of COVID-19 on nurse alcohol consumption: a qualitative exploration *J Clin Nurs*. 2024;33:368–80. <https://doi.org/10.1111/jocn.16467>.
- Sørensen JK, Pedersen AF, Vedsted P. *et al.* Substance use disorders among Danish physicians: an explorative study of the professional socialization and management of colleagues with substance use disorders *J Addict Med*. 2016;10:248–54. <https://doi.org/10.1097/adm.0000000000000228>.
- Tao R, Hsu M, Min K. *et al.* Alcohol misuse, health-related behaviors, and burnout among clinical therapists in China during the early Covid-19 pandemic: a nationwide survey *Front Public Health*. 2023;11. <https://doi.org/10.3389/fpubh.2023.1084259>.
- Tareq H, Nyberg A, Wennberg P. *et al.* Prevalence of problem drinking in the Swedish workforce: differences between labour market industries based on gender composition and main job activity *BMC Public Health*. 2024;24. <https://doi.org/10.1186/s12889-024-20163-y>.
- Thern E, Blindow KJ, Jonsson E. *et al.* Hazardous alcohol consumption across different industries in Sweden: a pooled cross-sectional study *Alcohol Alcohol*. 2024;59:agae077. <https://doi.org/10.1093/alcal/aga077>.
- Thiebaud P-C, Martin C, Naouri D. *et al.* Alcohol consumption among French physicians: a cross-sectional study *Drug Alcohol Depend*. 2021;218:108356. <https://doi.org/10.1016/j.drugalcdep.2020.108356>.
- Waithera HW, Ndumwa HP, Njiro BJ. *et al.* Alcohol use disorders among healthcare professionals: a call for action *Health Promot Int*. 2024;39:daae121. <https://doi.org/10.1093/heapro/daae121>.
- Walitzer KS, Connors GJ. Treating problem drinking *Alcohol Res Health*. 1999;23:138–43. Available at: <https://pubmed.ncbi.nlm.nih.gov/articles/PMC6760426/>.
- Wijeratne C, Johnco C, Draper B. *et al.* Older physicians' reporting of psychological distress, alcohol use, burnout and workplace stressors *Am J Geriatr Psychiatry*. 2021;29:478–87. <https://doi.org/10.1016/j.jagp.2020.09.010>.