

Risk factors for workplace sexual harassment and violence among women: A population-based study

Svava Dogg Jonsdottir, MAS^a, Arna Hauksdottir, PhD^a, Thor Aspelund, PhD^a, Johanna Jakobsdottir, PhD^a, Harpa Runarsdottir, MSc^a, Berglind Guðmundsdóttir, PhD^{a,b}, Gunnar Tomasson, PhD^a, Unnur Anna Valdimarsdottir, PhD^{a,c,d}, Thorhildur Halldorsdottir, PhD^{a,e*}, Edda Björk Thordardottir, PhD^{a*}

^aFaculty of Medicine, School of Health Sciences, University of Iceland, Reykjavík, Iceland

^bMental Health Services, Landspítali - The National University Hospital of Iceland, Reykjavík, Iceland

^cDepartment of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden

^dDepartment of Epidemiology, Harvard T H Chan School of Public Health, Boston, MA, USA

^eDepartment of Psychology, Reykjavík University, Reykjavík, Iceland

***Shared last authorship**

Submitted to Lancet Public Health
Word count: 3,228 (maximum 3500)

Summary

Background: Workplace sexual violence is a serious public health concern for women worldwide. Yet, little is known about its prevalence at a population-based level, especially across work sectors. The objective of this study was to investigate the prevalence of workplace sexual harassment and violence by demographic factors and work sectors among Icelandic women.

Methods: Participants were 15,799 women (aged 18-69, mean age 44.5 years) in the Stress-And-Gene-Analysis cohort, a nationally representative study of Icelandic females who completed questions on demographics, work-related factors, and experience of current and lifetime sexual harassment and violence. We used binomial and Poisson regression to study variation across demographic factors and 18 work sectors.

Findings: A third of participants (33·5%) reported having experienced workplace sexual harassment and violence over their lifetime, thereof 7·5% in their current workplace. Risk factors for harassment included being young (18-29 years PR 2·37, 95% CI 1·92-2·92; 30-44 years PR 2·10, 95% CI 1·71-2·56), belonging to sexual minorities (PR 1·35, 95% confidence interval (CI) 1·24-1·46), and working shifts (PR 2·32, 95% CI 2·02-2·67). The prevalence varied across work sectors with the highest rates observed among public figures (15·7%), women in tourism (15·0), and within the legal system and security (13·6%).

Interpretation: Lifetime exposure to workplace sexual harassment and violence is common among women in a Nordic welfare state. The findings provide nuanced targets for prevention efforts and public policies aimed at promoting women's safety in the work environment.

Funding: The Icelandic Gender Equality Fund; European Research Council; Icelandic Center for Research

Keywords: women, health, workplace, sexual harassment, sexual violence, trauma, LGBT+, #metoo

Research in context

Evidence before this study

We searched the following databases: Web of Science, PubMed, Sage Journals, and Science Direct, and Google Scholar for articles published before the 14th of February 2022 with the search terms: “workplace sexual harassment”, “workplace sexual harassment and violence”, “occupational violence” and “workplace violence”. The following search terms were sometimes added: “among women”, “prevalence”, “risk factors”, “national study”, and “population-based study”. Additionally, we searched for reports on sexual harassment on websites of public sector bodies and organizations (e.g., Center on Gender Equity and Health (GEH)). Previous studies indicate that workplace sexual harassment and violence is common among women worldwide (11-72%), although the prevalence varies considerably across studies due to selected study populations (e.g., women in academia) and varying assessment methods. Previous studies have been limited by small sample size, and study populations limited to a specific work sector or professions.

Added value of this study

Increased knowledge on the epidemiology of workplace sexual harassment and violence is crucial for the development of effective workplace policies and preventive measures. Utilizing a nationally representative cohort of 15,799 women 18-69 years old, this study is, to the best of our knowledge, the first to assess prevalence rates of sexual harassment and violence in a nationally representative cohort of females employed in various work sectors. Furthermore, potential risk factors associated with workplace sexual harassment and violence were identified, including sexual orientation, which little is known about within this context. We found the prevalence of workplace sexual harassment and violence to be highest among women who are defined as public figures (e.g. politicians, anchorwomen, those who work in the legal system and security, and in tourist services, as well as among young women, sexual minorities and in workplaces where shift work is common. The findings of this study provide valuable information to improve public policies aimed at promoting women’s safety in the work environment.

Implications of all the available evidence

The current study provides evidence for how widespread workplace sexual harassment is among women residing in a Nordic welfare state, particularly among young women and those working shifts. The current study adds nuanced information on the prevalence of sexual harassment across a variety of work sectors, identifying sectors where women are at high risk for such exposure. Taken together, these findings provide guidance as to where interventions are needed such as in work sectors with a third-party presence (e.g., patients, clients, or customers) and a general high male to female ratio.

Introduction

Sexual harassment and violence constitutes any unwanted conduct of a sexual nature with the purpose of violating an individual's dignity or creating an intimidating, hostile, degrading, humiliating, or offensive environment.¹

Women who are subjected to sexual harassment or violence seldom file complaints or report their experiences to their supervisors.² They are however more likely than other women to quit their job due to the harassment.³ Being subjected to workplace sexual harassment has been associated with decreased self-confidence and increased stress, as well as fatigue, sleeping problems, anxiety, depression, and suicidal ideation.⁴⁻⁸ Despite these reported negative effects, workplace sexual harassment and violence has been understudied worldwide.⁹

The reported global prevalence rates of workplace sexual harassment and violence among women varies greatly between studies, ranging from 11-72%,^{2,6,10-12} and accumulating evidence suggests that rates may differ by work sector.^{9,13} High prevalence rates have been documented among female social and healthcare workers (51-69%),¹⁴ journalists (57%),¹⁵ and women working in the STEM sector (i.e. science, technology, engineering, and mathematics) (46%).¹⁶ Sexual harassment and violence in the academic environment is also common, with 22-47% of female graduate students report having been subjected to sexual harassment by a faculty member and 34-58% by another student.¹⁷⁻²⁰ However, there is great variability in prevalence rates across studies, largely due to varying methodology.^{9,13}

Few studies have assessed potential risk factors for workplace sexual harassment and violence. The few existing studies indicate that workplace sexual harassment and violence is more commonly experienced by younger women (i.e. 18-39 years old)^{21,22} and those who are highly educated.²³ A recent Australian report found that individuals belonging to sexual minorities (e.g. gay, lesbian, bisexual, or pansexual) were more likely to have been subjected to sexual harassment and violence at work in the past five years than heterosexuals (52% and 31%, respectively).²²

Although previous studies have been informative, their generalizability has been limited due to small sample sizes and their focus on specific work sectors.^{9,13} To the best of our knowledge, no previous study has examined the rates of sexual harassment and violence across work sectors at a population-based level. The present study, therefore, aims to expand on the literature by utilizing a nationally representative cohort of 15,799 women to assess the prevalence of workplace sexual harassment and violence by demographic factors (e.g. age, sexual orientation, and education) and 18 work sectors.

Methods

Study design and population

We utilized data from the Icelandic (SAGA) Stress-And-Gene-Analysis cohort, a nationwide population-based study assessing the impact of trauma on women's health. All women residing in Iceland, aged 18-69 years, were invited to participate in an online survey from March 2018. Overall, 30,403 women participated, representing approximately 30% of women residing in Iceland in the age range 18-69. Participants in the present study were 15,799 women (based on the status of the cohort in 2021) who answered an item assessing exposure to workplace sexual

harassment and violence, which was added to the online survey in May 2018. Participants in the present study are representative of the general Icelandic female population in terms of distribution of age, education level, monthly wages, and geographical location (see Supplementary appendix 1).^{24,25} One item pertaining to sexual orientation was added in June 2018 to the online survey (11,286 answered). To include all 15,799 participants in the analysis, three items (i.e., sexual orientation, work hours, and work schedule) were coded with unknown values included (see Table 1).

The study was approved by the National Bioethics Committee of Iceland (grant nr. VSNb2017110046/03.01) and the Icelandic Data Protection Authority.

Measurement of exposure

In accordance with other studies,²⁶ workplace sexual harassment and violence was assessed with the following question: “Have you experienced sexual harassment or violence in your work or academic environment?”. The response options were: 1) no 2) yes, in my current work or academic environment 3) yes, in my former work or academic environment 4) yes, in both my current and former work or academic environment. The answers were coded according to two exposures of interest: Exposure to sexual harassment and violence in a current workplace (irrespective of previous exposure), and exposure to sexual harassment and violence over lifetime (in the current workplace, a previous workplace or both).

Demographic & work factors

Demographic characteristics include age (classified as: 18-29, 30-44, 45-59, and 60-69 years), sexual orientation (classified as: heterosexual, sexual minorities, and can/will not answer), attained education level (classified as: elementary, high school, vocational, university, other, and can/will not answer), current income (classified as: ≤ €2040, €2041-3400, €3401-4761, > €4761, and can/will not answer), and relationship status (classified as: married or in a relationship, single, and can/will not answer). Response options participant’s employment status were: full-time work, part-time work, self-employed, student, homemaker/ on parental leave, retired, on disability, on >2-month sick leave, and unemployed. In addition, information on number of weekly working hours (classified as: <20 hours, 20-39 hours, 40-59 hours, 60-79 hours, and >80 hours), work schedule (classified as: day job, shift work, and irregular hours), and sick leave from work in the past year were assessed.

Participant’s current work sector was assessed with the open-ended question: “How would you describe your job title?” (N=7,557). The answers were manually coded into 43 groups that represented similar professions and/or work environments. The profession groups were then further categorized into 18 different work sectors based on the categorization system from the United States Bureau of Labor Statistics²⁷ and adapted to the Icelandic work environment (e.g., a Tourist Services sector was added; and the “Architecture and Engineering” and “Computer and Mathematical” sectors were collapsed together into the work sector Technology & Software) (see Supplementary appendix 2).

Statistical analysis

R was used for statistical analysis.²⁸ First, we examined the differences based on the demographic and work-related factors in the prevalence of sexual harassment and violence in the current workplace using chi-square tests. Next, we used Poisson log-linear models with robust error variance to assess the association with prevalence ratios and 95% confidence intervals. The effect estimate is an incidence rate ratio (IRR) which can be interpreted as a prevalence ratio.^{29,30} Both crude results and results adjusted for age are presented. For analyses on the work sectors we used the R-package emmeans³¹ and created a binomial model with adjustments for age, income, and work schedule to estimate prevalence rates and 95% confidence intervals for exposure to workplace sexual harassment and violence in the current workplace (see Supplementary appendix 3 for unadjusted rates). Lastly, we compared the lifetime prevalence of sexual harassment and violence within the workplace by demographics and work-related factors.

Results

The mean age of the women (N=15,799) in this study was 44·5 years (SD=14·0). Overall, the lifetime prevalence of workplace sexual harassment and violence was 33·5% (5,291/15,799), with 7·5% (1,178/15,799) of women experiencing harassment and violence in their current workplace. In addition to the results presented, we examined the association of demographic characteristics and adjusted predictions of harassment and violence quartiles using chi-square tests. The results from the tests further confirmed the groups at the highest risk of exposure to workplace sexual harassment and violence (see Supplementary appendix 4).

Sexual harassment and violence in the current workplace

The prevalence of workplace sexual harassment and violence in the current workplace varied by all demographic factors (Table 1). The rates were highest among young women aged 18-29 years (9·9%), among women of sexual minorities (9·6%), among single women (9·3%), among university educated women (8·0%), and women with high income (9·3% for income €3401-4761, and 9·2% for income > €4761). When assessing work-related factors, we found that current workplace harassment and violence was more common among women working longer hours (13·2% among women working 60-79 hours weekly and 11·4% among women working 80 hours or more weekly). The prevalence of workplace sexual harassment and violence in the current workplace was also higher among women working shifts (17·7%) (see Table 1).

Table 2 presents current employment status with regard to exposure to workplace sexual harassment and violence. Eight percent of women in full time work reported experiencing sexual harassment and violence in the current workplace. Of women who were exclusively students, 5·9% had experienced sexual harassment or violence in their current academic environment. The prevalence of sexual harassment and violence in the current workplace was highest among women who were both employed and studying (12·3%) and lowest among women who were self-employed (4·9%).

Differences, as expressed as prevalence ratios (PR) and 95% confidence intervals (CI), in the prevalence of sexual harassment and violence by demographic characteristics and work-related factors are shown in Table 3. We found that compared to women 60-69 years old, younger women were at elevated risk of sexual harassment and violence

in their current workplace (PR 2.37; 95% CI 1.92-2.92 for 18–29-year-old women, and PR 2.10; 95% CI 1.71-2.56 for 30-44 year old women). Adjusting for age, single women (PR 1.27; 95% CI 1.12-1.43), university-educated women (PR 1.44; 95% CI 1.21-1.71), and those with high income (PR 1.92; 95% CI 1.65-2.24, for income € 3401-4761, and PR 1.93; 95% CI 1.61-2.30, for income € >4761), were also at elevated risk of sexual harassment and violence in the current workplace. In addition, women working long hours weekly (40-59 hours; PR 1.36; 95% CI 1.09-1.70, 60-79 hours; PR 1.97; 95% CI 1.45-2.67, and >80 hours; PR 1.74; 95% CI 1.05-2.88), working shifts (PR 2.32; 95% CI 2.02-2.67) and irregular hours (PR 1.42; 95% CI 1.20-1.67) were at elevated risk of sexual harassment or violence in a current workplace.

Figure 1 shows the prevalence of current workplace sexual harassment and violence by work sector, adjusted for age, work schedule, and income. The highest prevalence of sexual harassment and violence in the current workplace was among women working as public figures (15.7%), in tourism (15.0%), and in the legal system and security (13.6%). The lowest prevalence was among women working in office and administration (5.9%), personal care and services (6.1%), and restaurant and catering (6.4%).

Lifetime exposure to workplace sexual harassment and violence

The prevalence of lifetime exposure to workplace sexual harassment and violence was highest among women aged 18-29 years (37.6%), sexual minorities (48.7%), single women (39.1%), those with vocational education (35.5%), and those with an income over €4761 (35.8%). Exposure to workplace sexual harassment and violence over the lifetime was also more common among women working 60-79 hours weekly (43.6%), and those working shift work (41.3%) (see Table 1).

Regarding current employment status, the prevalence of lifetime exposure to workplace sexual harassment and violence was highest among women who were unemployed (44.1%) and among those on sick leave lasting longer than two months (43.1%) (Table 2).

Results from the Poisson analysis indicated that younger women were at elevated risk of exposure over their lifetime compared to women aged 60-69 (PR 1.42; 95% CI 1.31-1.54 for 18–29-year-old women and PR 1.41; 95% CI 1.31-1.52 for 30–44-year-old women). Adjusting for age, women belonging to sexual minorities (PR 1.35; 95% CI 1.24-1.46), single women (PR 1.20; 95% CI 1.15-1.26), women with vocational education (PR 1.22; 95% CI 1.10-1.35), and university education (PR 1.16; 95% CI 1.09-1.24) were at elevated risk of lifetime exposure to sexual harassment or violence. Women working long weekly hours (60-79 hours; PR 1.40; 95% CI 1.23-1.60, and >80 hours; PR 1.32; 95% CI 1.06-1.64), working shifts (PR 1.33; 95% CI 1.24-1.43) and irregular hours (PR 1.29; 95% CI 1.21-1.39) were also at increased risk (Table 3).

Table 1. Association of demographic characteristics and exposure to workplace sexual harassment and violence among the study population (N=15,799).

	Total n (%) N=15799	Workplace sexual harassment and violence			Over lifetime n (%) N=5291	P-value
		Never n (%) N=10508	Current workplace ^a n (%) N=1178	Previous workplace ^b n (%) N=4113		
Age						<0.001
18-29	3041 (19.2)	1898 (62.4)	302 (9.9)	841 (27.7)	1143 (37.6)	
30-44	4547 (28.8)	2851 (62.7)	399 (8.8)	1297 (28.5)	1696 (37.3)	
45-59	5516 (34.9)	3777 (68.5)	364 (6.6)	1375 (24.9)	1739 (31.5)	
60-69	2695 (17.1)	1982 (73.5)	113 (4.2)	600 (22.3)	713 (26.5)	
Sexual orientation						<0.001
Heterosexual	10544 (66.7)	6996 (66.4)	810 (7.7)	2738 (26.0)	3548 (33.6)	
Sexual minorities	742 (4.7)	103 (61.3)	71 (9.6)	290 (39.1)	361 (48.7)	
Can/will not answer	38 (0.2)	28 (73.7)	N<10	N<10	10 (26.3)	
No information ^c	4475 (28.3)	3103 (69.3)	292 (6.5)	1080 (24.1)	1372 (30.7)	
Relationship status						<0.001
Married or in a relationship	12099 (76.6)	8251 (68.2)	837 (6.9)	3011 (24.9)	3848 (31.8)	
Single	3625 (22.9)	2206 (60.9)	337 (9.3)	1082 (29.8)	1419 (39.1)	
Can/will not answer	75 (0.5)	51 (68.0)	N<10	20 (26.7)	24 (32.0)	
Education						<0.001
Elementary	2623 (16.6)	1843 (70.3)	149 (5.7)	631 (24.0)	780 (29.7)	
High School	3214 (20.3)	2147 (66.8)	253 (7.9)	814 (25.3)	1067 (33.2)	
Vocational	966 (6.1)	623 (64.5)	71 (7.3)	272 (28.2)	343 (35.5)	
University	7906 (50.0)	5188 (65.6)	632 (8.0)	2086 (26.4)	2718 (34.4)	
Other	1020 (6.6)	651 (63.8)	73 (7.2)	296 (29.0)	369 (36.2)	
Can/will not answer	70 (0.4)	56 (80.0)	N<10	14 (20.0)	14 (20.0)	
Monthly income						<0.001
≤ €2040	4817 (30.5)	3101 (64.4)	287 (5.9)	1429 (29.7)	1716 (35.6)	
€2041-3400	4647 (29.4)	3192 (68.7)	336 (7.2)	1119 (24.1)	1455 (31.3)	
€3401-4761	3573 (22.6)	2401 (67.2)	332 (9.3)	840 (23.5)	1172 (32.8)	
> €4761	2083 (13.2)	1338 (64.2)	192 (9.2)	553 (26.6)	745 (35.8)	
Can/will not answer	679 (4.3)	476 (70.1)	31 (4.6)	172 (25.3)	203 (29.9)	
Weekly work hours						<0.001
<20 hours	1025 (6.5)	674 (65.8)	83 (8.1)	268 (26.1)	351 (34.2)	
20-39 hours	4267 (27.0)	2977 (69.8)	311 (7.3)	979 (22.9)	1290 (30.2)	
40-59 hours	6665 (42.2)	4473 (67.1)	584 (8.8)	1608 (24.1)	2192 (32.9)	
60-79 hours	507 (3.2)	286 (56.4)	67 (13.2)	154 (30.4)	221 (43.6)	
≥80 hours	140 (0.9)	83 (59.3)	16 (11.4)	41 (29.3)	57 (40.7)	
Not relevant ^d	3195 (20.2)	2015 (63.1)	117 (3.7)	1063 (33.3)	1180 (36.9)	
Work schedule						<0.001
Day job	8379 (53.0)	5923 (70.7)	563 (6.7)	1893 (22.6)	2456 (29.3)	
Shift work	1555 (9.8)	913 (58.7)	275 (17.7)	367 (23.6)	642 (41.3)	
Irregular	1697 (10.7)	1047 (61.7)	166 (9.8)	484 (28.5)	650 (38.3)	
Not relevant ^e	4168 (26.4)	2625 (63.0)	174 (4.2)	1369 (32.8)	1543 (37.0)	

^a Exposure to sexual harassment/violence in the current workplace, irrespective of previous exposure. ^b Exposure to sexual harassment/violence solely in a previous workplace. ^c Did not receive the question since it was added later to the questionnaire. ^d Did not receive the question as they were unemployed or only students.

Table 2. Current employment status with regard to exposure to workplace sexual harassment and violence.

Current employment status	Total n (%) N=15799	Mean age (SD)	Workplace sexual harassment and violence			
			Never n (%) N=10508	Current ^a n (%) N=1178	Previous ^b n (%) N=4113	Lifetime n (%) N=5291
Full-time work	7002 (44.3)	45.2 (12.0)	4797 (68.5)	610 (8.7)	1595 (22.8)	2205 (31.5)
Part-time work	2186 (13.8)	49.1 (12.9)	1554 (71.1)	175 (8.0)	457 (20.9)	632 (28.9)
Employer	955 (6.0)	48.5 (10.4)	622 (65.1)	47 (4.9)	286 (29.9)	333 (34.9)
Student (only)	973 (6.2)	27.3 (8.8)	610 (62.7)	57 (5.9)	306 (31.4)	363 (37.3)
Student & working	1272 (8.1)	30.3 (10.8)	771 (60.6)	156 (12.3)	345 (27.1)	501 (39.4)
Disability (only)	1228 (7.8)	51.3 (11.1)	743 (60.5)	NA	454 (37.0)	485 (39.5)
Disability & working	216 (1.4)	48.8 (10.6)	139 (64.4)	16 (7.4)	61 (28.2)	77 (35.6)
>2-month sick leave	399 (2.5)	45.5 (12.8)	227 (56.9)	NA	140 (35.1)	172 (43.1)
Homemaker/parental leave	601 (3.8)	36.3 (10.8)	381 (63.4)	NA	188 (31.3)	220 (36.6)
Retired	559 (3.5)	66.6 (4.1)	433 (77.5)	NA	119 (21.3)	126 (22.5)
Unemployed	290 (1.8)	41.4 (14.4)	162 (55.9)	NA	120 (41.4)	128 (44.1)
Can/will not answer	118 (0.8)	45.8 (15.1)	69 (58.5)	N<10	42 (35.6)	49 (41.5)

^a Exposure to sexual harassment/violence in the current workplace, irrespective of previous exposure. ^b Exposure to sexual harassment/violence solely in a previous workplace.

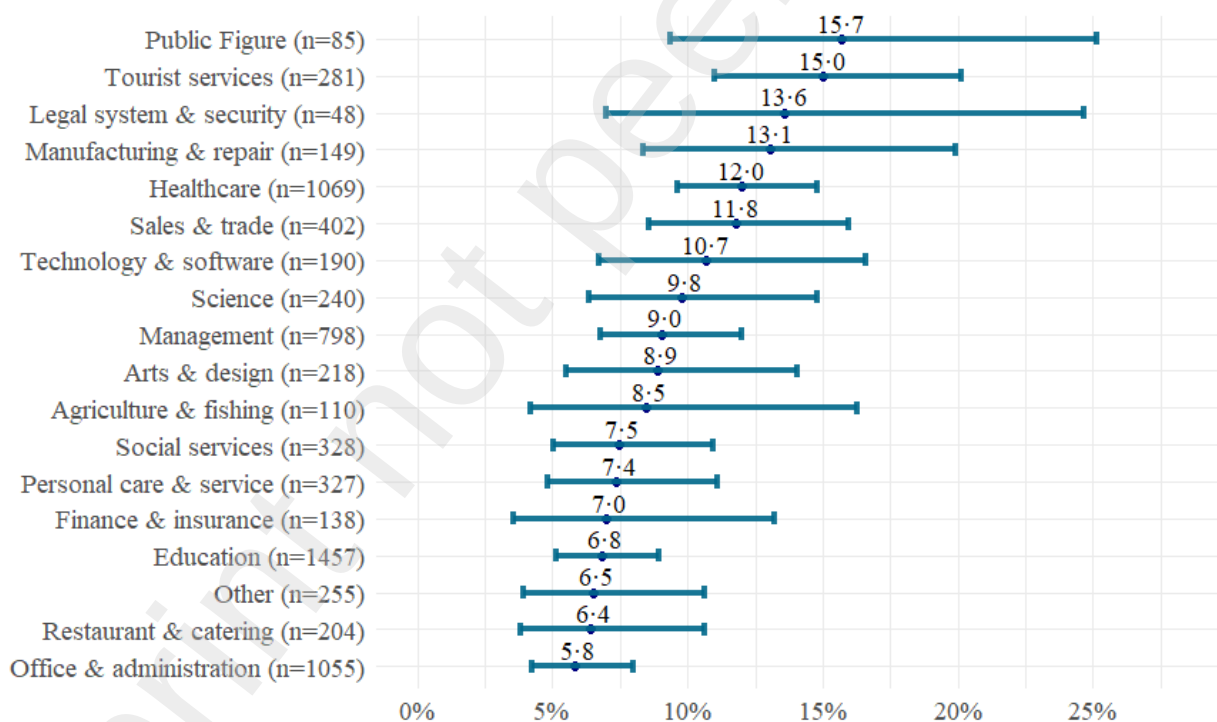


Figure 1. Exposure to workplace sexual harassment and violence in the current workplace with regard to work sector, expressed as prevalence rates and 95% confidence intervals adjusted for age, work schedule and income.

Table 3. The association of demographic characteristics and exposure to workplace sexual harassment and violence, expressed as prevalence ratios and 95% confidence intervals.

	Harassment/violence in current workplace			Harassment/violence in workplace over lifetime		
	Yes (%)	PR (95% CI)	PR ^a (95% CI)	Yes (%)	PR (95% CI)	PR ^a (95% CI)
Age						
60-69	113 (4.2)	1.00 (Ref)	NA	713 (26.5)	1.00 (Ref)	NA
45-59	364 (6.6)	1.57 (1.28-1.93)	NA	1739 (31.5)	1.19 (1.11-1.28)	NA
30-44	399 (8.8)	2.10 (1.71-2.56)	NA	1696 (37.3)	1.41 (1.31-1.52)	NA
18-29	302 (9.9)	2.37 (1.92-2.92)	NA	1143 (37.6)	1.42 (1.31-1.54)	NA
Sexual orientation						
Heterosexual	810 (7.7)	1.00 (Ref)	1.00 (Ref)	3548 (33.6)	1.00 (Ref)	1.00 (Ref)
Sexual minorities	71 (9.6)	1.25 (0.99-1.57)	1.03 (0.82-1.31)	361 (48.7)	1.45 (1.34-1.56)	1.35 (1.24-1.46)
Relationship status						
Married or in a relationship	837 (6.9)	1.00 (Ref)	1.00 (Ref)	3848 (31.8)	1.00 (Ref)	1.00 (Ref)
Single	337 (9.3)	1.34 (1.19-1.52)	1.27 (1.12-1.43)	1419 (39.1)	1.23 (1.17-1.29)	1.20 (1.15-1.26)
Education						
Elementary	149 (5.7)	1.00 (Ref)	1.00 (Ref)	780 (29.7)	1.00 (Ref)	1.00 (Ref)
High School	253 (7.9)	1.39 (1.14-1.69)	1.24 (1.02-1.52)	1067 (33.2)	1.12 (1.03-1.21)	1.06 (0.98-1.15)
Vocational	71 (7.3)	1.29 (0.98-1.70)	1.37 (1.04-1.79)	343 (35.5)	1.19 (1.08-1.32)	1.22 (1.10-1.35)
University	632 (8.0)	1.41 (1.18-1.67)	1.44 (1.21-1.71)	2718 (34.4)	1.16 (1.08-1.24)	1.16 (1.09-1.24)
Other	73 (7.2)	1.26 (0.96-1.65)	1.44 (1.10-1.89)	369 (36.2)	1.22 (1.10-1.35)	1.28 (1.16-1.42)
Monthly income						
€ ≤2040	287 (6.0)	1.00 (Ref)	1.00 (Ref)	1716 (35.6)	1.00 (Ref)	1.00 (Ref)
€ 2041-3400	336 (7.2)	1.21 (1.04-1.41)	1.42 (1.22-1.65)	1455 (31.3)	0.88 (0.83-0.93)	0.92 (0.87-0.98)
€ 3401-4761	332 (9.3)	1.56 (1.34-1.82)	1.92 (1.65-2.24)	1172 (32.8)	0.92 (0.87-0.98)	0.98 (0.92-1.04)
€ >4761	192 (9.2)	1.55 (1.29-1.84)	1.93 (1.61-2.30)	745 (35.8)	1.00 (0.94-1.08)	1.07 (1.00-1.15)
Weekly work hours						
<20 hours	83 (8.1)	1.00 (Ref)	1.00 (Ref)	351 (34.2)	1.00 (Ref)	1.00 (Ref)
20-39 hours	311 (7.29)	0.90 (0.71-1.14)	1.13 (0.89-1.43)	1290 (30.2)	0.88 (0.80-0.97)	0.99 (0.90-1.10)
40-59 hours	584 (8.76)	1.08 (0.87-1.35)	1.36 (1.09-1.70)	2192 (32.9)	0.96 (0.88-1.05)	1.08 (0.98-1.19)
60-79 hours	67 (13.21)	1.63 (1.20-2.21)	1.97 (1.45-2.67)	221 (43.6)	1.27 (1.12-1.45)	1.40 (1.23-1.60)
>80 hours	16 (11.43)	1.41 (0.85-2.34)	1.74 (1.05-2.88)	57 (40.7)	1.19 (0.96-1.48)	1.32 (1.06-1.64)
Work schedule						
Day job	563 (6.7)	1.00 (Ref)	1.00 (Ref)	2456 (29.3)	1.00 (Ref)	1.00 (Ref)
Shift work	275 (17.7)	2.63 (2.30-3.01)	2.32 (2.02-2.67)	642 (41.3)	1.41 (1.32-1.50)	1.33 (1.24-1.43)
Irregular	166 (9.8)	1.46 (1.23-1.72)	1.42 (1.20-1.67)	650 (38.3)	1.31 (1.22-1.40)	1.29 (1.21-1.39)

^a Adjusted for age

Discussion

This large-scale cohort study is, to our knowledge, the first to examine the prevalence of workplace sexual harassment and violence among women at a population-based level across multiple work sectors. Findings indicates that approximately one-third have been exposed to workplace sexual harassment and violence over their lifetime, with 8% having been exposed in their current workplace. Due to varying methodology in prior research, it is

difficult to compare these results to prior findings. Two population-based studies from 2020, conducted in Denmark and Sweden, found the prevalence of current workplace sexual harassment to be 2% and 5%, respectively.^{7,8} However, neither study reported separate rates for men and women, which likely resulted in lower rates than in our study. Our study was also administered shortly after the start of the global #metoo movement which was very prominent in Iceland and might have influenced reporting rates.

As documented in prior studies, current workplace sexual harassment and violence was more common among younger women.^{21,22} We also found the risk of current workplace exposure to be higher among women working long hours and among those with high income, consistent with findings from a study conducted in 28 European Union member states.² This is possibly due to high-income women being more likely to work in a male-dominated environment and could also be partly explained by women with higher income working longer hours, which could increase the risk of exposure to harassment. This explanation might also apply as to why university-educated women were at increased risk of experiencing harassment, as they were more likely to work ≥ 40 hours per week than women with other education (66.2% vs. 48.5%, $p < 0.001$). We further found that women working shifts and irregular hours were at increased risk of current workplace harassment compared to women working during the day. Possibly, women working evenings and nights are more likely to be working alone, due to understaffing or less workload after office hours. They are also more likely to be in contact with third-party individuals such as patients and clients, possibly increasing the risk of being subjected to sexual harassment and violence at work.³²

Our findings suggest that sexual harassment and violence is relatively common among students, consistent with findings from prior studies.¹⁷⁻²⁰ Interestingly, we found unemployed women to be more likely to report exposure to workplace sexual harassment and violence in a previous workplace. Possibly some of these unemployed women quit their jobs due to being sexually harassed in their workplace. Indeed, results from a national sample of American workers, found that 40% of women who reported experiencing workplace sexual harassment changed their job as a result of harassment.³

We found that certain work sectors had higher rates of current workplace exposure than others, specifically public figures (e.g., media, politicians, actors), tourist services, legal system and security, manufacturing and repair (e.g., factories, construction work), and healthcare. These work sectors have a third-party presence (e.g. patients, clients, customers) which could increase the risk of exposure. Specifically, women in these sectors could have experienced harassment from their colleagues, superiors, or third-party individuals such as patients, clients, or customers. Unfortunately, we have no information on women's relationship with the perpetrator which calls for further attention of future work in this area. However, a recent study in South Korea found third-party presence to be a significant risk factor for sexual harassment.³² Another factor that could affect high prevalence rates are male-dominated work environments.²¹ This could, for example, have contributed to high rates in sectors such as the legal system and security and technology and software, where the male to female ratio is higher than in many other work sectors. In line with this observation, previous studies have suggested that higher male to female ratio may contribute to higher rates of sexual harassment.²¹ Overall, comparing the results to previous studies is challenging as they have mainly been limited to specific work sectors and thus, not compared prevalence across sectors. Yet, our

findings are supported by previous studies suggesting high prevalence among women working in healthcare,¹⁴ media,¹⁵ and technology.¹⁶

Younger women were more likely to report having been exposed to workplace sexual harassment and violence over their lifetime, despite older women having spent more years in the labor market. This could possibly be due to recall bias resulting from generational differences in what behaviors constitute workplace sexual harassment. Furthermore, the #metoo movement led to a more open discussion of workplace sexual harassment and violence which might have made younger women in the study more willing to share their experiences as well as influenced how they conceptualize it. In line with recent findings,^{22,33} our results further indicate that women belonging to sexual minorities are more likely than heterosexual women to have experienced workplace sexual harassment and violence over their lifetime. Possibly, this difference can be traced to the sexualization of LGBTQ+ people's identities, as well as the stereotype that LGBTQ+ people focus heavily on sexual activity.³³ This might make them more likely to be subjected to inappropriate comments at work regarding their sex lives. To date, studies on sensitive groups such as LGBTQ+ people are scarce, and further studies are needed assess the manifestation of sexual harassment that they are subjected to.

Strengths of our study include a large population size (N = 15,799), representative of the adult female population in Iceland with respect to demographic characteristics. This is also the first study to assess the prevalence of workplace sexual harassment and violence across different work sectors at a population-based level. However, the generalizability of our results is limited to Icelandic women. Since very few report experiences of sexual harassment and violence to their supervisors,² self-report measures are crucial to gain a more accurate picture of the prevalence. The method of self-report is, therefore, a strength of our study. Misclassification and recall bias might limit the study as both exposure and outcome variables were assessed at the same time. Most of the studied factors (age, education, work sectors) are relatively stable and therefore likely to represent real risk factors. Furthermore, we assessed the prevalence by directly asking the participants if they had experienced sexual harassment and/or violence at work, as opposed to listing pre-defined behaviors. This required them to define what behaviors constitute sexual harassment themselves. People may define sexual harassment differently so, usually, listing behaviors results in higher prevalence rates.²⁶ Despite being a population-based study, it should also be noted that a limited number of women reported working in legal system and security (48 women) or as public figures (85 women), and therefore results from those work sectors need to be interpreted with caution.

In conclusion, our findings confirm high prevalence of sexual harassment among women residing in a Nordic welfare state repeatedly scoring highest in the world on measures of gender equality.³⁴ Our results indicate that one third of women residing in Iceland are exposed to workplace sexual harassment and/or violence over their lifetime and that prevalence rates vary significantly by work sectors. Young women, highly educated, and those working shifts or irregular hours are at increased risk of exposure as are women belonging to sexual minorities. Sexual harassment and violence in the workplace have been found to negatively affect the well-being of those exposed.⁴⁻⁸ As such, it is crucial that effective prevention and intervention efforts are developed to tackle this pressing public health concern. Our results highlight the need to target interventions in workplaces where shift work and long hours

are common, and in specific work sectors, particularly in the legal system and security, tourism, healthcare, and among public figures.

Data sharing

The data used in this study are compiled in the Stress-And-Gene-Analysis (SAGA) cohort. We cannot make the data publicly available because of Icelandic laws regarding data protection and the approval for the current study granted by the National Bioethics Committee (NBC) of Iceland. The SAGA cohort contains extremely sensitive data, and all use of data is restricted to scientific purposes only subjected to the approval of NBC (email: vsu@vsu.is) Interested researchers can obtain access to deidentified data by submitting a proposal to the SAGA cohort data management board (email: afallasaga@hi.is) which assists with submitting an amendment to the NBC. The corresponding author of the present study submitted a research proposal to the SAGA cohort data management board / the NBC and got access only to deidentified data, that cannot be shared in any way.

Declaration of interest

We declare no competing interests.

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