

Work-related injury burden, workers' compensation claim filing, and barriers: Results from a statewide survey of janitors

Naomi J. Anderson MPH  | Caroline K. Smith PhD, MPH | Michael P. Foley MA 

Washington State Department of Labor & Industries, Olympia, Washington, USA

Correspondence

Naomi J. Anderson, MPH, Washington State Department of Labor & Industries, Safety & Health Assessment & Research for Prevention (SHARP) Program, PO Box 44330, Olympia, WA 98504-4330, USA.

Email: Naomi.Anderson@Lni.wa.gov

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Abstract

Background: Janitors are a low-wage, ethnically and linguistically diverse, hard-to-reach population of workers with a high burden of occupational injury and illness.

Methods: Data from an extensive multimodal (mail, phone, web) survey of janitors in Washington State were analyzed to characterize their working conditions and occupational health experiences. The survey included questions on demographics, work organization and tasks, health and safety topics, and discrimination and harassment. The survey was administered in eight languages.

Results: There were 620 complete interviews. The majority completed the survey by mail (62.6%), and in English (85.8%). More than half of responding janitors were female (56.9%), and the mean age was 45 years. Twenty percent reported having a (health-care-provider diagnosed) work-related injury or illness (WRII) in the past twelve months. Women and janitors who were Latino had significantly higher relative risk of WRII. Increased risk was also associated with several work organization factors that may indicate poor working conditions, insufficient sleep, and possible depression. Half of injured janitors did not file workers' compensation (WC) claims.

Conclusions: Janitors reported a high percentage of WRII, which exceeded previously published estimates from Washington State. Women and Latino janitors had significantly increased risk of WRII, and janitors' working conditions may influence the unequal distribution of risk. WRII surveillance via WC or medical care usage in janitors and other low-wage occupations may reflect substantial underreporting. Characterizing the nature of janitors' work experience can help identify avenues for prevention, intervention, and policy changes to protect the health and safety of janitors.

KEYWORDS

claim filing, claim suppression, cleaners, health disparities, historically marginalized workers, janitors, low wage, occupational health, occupational injuries, retaliation, workers' compensation, work-related injuries

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1 | INTRODUCTION

Janitors in the United States comprise a large, ethnically and linguistically diverse occupational group of low-wage, low-status workers facing a high burden of occupational injury and illness.^{1–4} In Washington State, Janitors are one of the largest occupational groups (ranked 12th in the state, an estimated 40,586 in 2021),⁵ and nationally, janitors are among the top 10 occupations projected to have the highest number of new jobs from 2018 to 2028.⁶ The average annual wage for janitors in WA is around \$30,000,^{7,8} which is significantly less than the state average for all industries (\$69,615)⁷ though higher than janitors nationally.⁸

Janitors have a high burden of occupational injury and illness due to the wide range of physical demands and chemical exposures experienced on the job.^{1–3,9–18} These include, but are not limited to: work-related asthma and respiratory disorders,^{19–22} musculoskeletal issues,^{12,13,18,23,24} and dermal and ocular irritation.^{11,17} Janitorial work may also be associated with increased risk of birth defects and poor pregnancy outcomes,^{25–27} as well as certain cancers.^{28–30}

The U.S. Bureau of Labor Statistics Occupational Injuries/Illnesses and Fatal Injuries Profiles data for the United States (private industry, 2019) shows an incidence rate for the “Janitorial Services” industry (North American Industry Classification System (NAICS) 561720) of nonfatal occupational injuries and illness involving days away from work of 107.5 per 10,000 full-time workers, higher than the rate for private industry as a whole (86.9 per 10,000 full-time workers).³¹ By occupation, using Standard Occupational Classification (SOC) codes for “Janitors and cleaners, except maids and housekeeping cleaners” (SOC 372011) the incidence rate for injuries and illnesses involving days away from work was 157.4 per 10,000 full-time workers in 2019, nearly twice the rate of 86.9 per 10,000 workers for “all occupations.”³² When looking at selected events or exposures leading to injury or illness by occupation, “Janitors and cleaners, except maids and housekeeping cleaners” (SOC 372011) had higher rates per 10,000 full-time workers than “all occupations” in events such as “Struck by object or equipment” (20.4 vs. 13.2), “Falls, slips, trips” (55.9 vs. 23.9), “Overexertion and bodily reaction” (47.1 vs. 27.0), and “Exposure to harmful substances or environments” (6.4 vs. 3.6).³³

Workplace injuries for janitors come at sizeable costs to the worker and to society, with an estimated 4.1 billion dollars in medical and productivity costs, annually in the United States, the 2nd highest cost total of the low-wage occupations studied.³⁴ These costs include both direct (e.g., medical care) and indirect (e.g., productivity) losses.³⁴ Janitors were ranked among the occupations at highest risk for a variety of occupational injuries, illnesses, and fatalities when compared with other occupations in an analysis of workers' compensation (WC) data,³⁵ and another study found “Services to Buildings” (Standard Industrial Classification Code 734, which includes janitorial services) was ranked 33rd highest out of 313 industries for total costs for fatal and nonfatal injuries and illnesses.³⁶ In WA, “Services to Buildings and Dwellings” (NAICS industry group 5617) was ranked at highest risk overall by prevention index (a metric averaging injury

count and rate to prioritize industries or occupations for prevention and intervention) from 2002 to 2010, consistently ranking in the top 25 industry groups across seven common injury types.²

The majority of commercial cleaning work is performed by workers employed by specialized janitorial services firms that contract either directly with clients, or with a building management firm that provides a range of building management services to clients. The firm that controls the worksite and determines the scope of the work—the client—is distinct from the firm that employs and supervises the janitors. This organizational structure, termed “fissured” or “outsourced,” became widespread in the late 20th century as part of a broad set of organizational changes that saw large, multifunctional firms shed many “non-core” activities that had been performed in-house by the firm's own employees. The aim of this shift was to allow the firm to reduce labor costs for ongoing, noncore activities. The source of labor cost reduction is that janitorial workers who are directly employed in a large multifunctional firm had both higher wages and benefits than did their counterparts working for small, specialized contract cleaning firms. By shedding these activities, lead firms could exclude some workers from participation in such benefits programs and convert a compensation and supervision issue into a transaction to be settled by contracting with a vendor in a competitive market.^{37,38} Empirical estimates of the wage reduction realized by firms that outsource such noncore activities range from 4%–7%³⁹ to 15%–17%⁴⁰ and these studies found that outsourced janitorial workers were much less likely to receive employer-sponsored health insurance coverage.

Small janitorial services firms contracting with clients in a competitive market with low barriers to entry for new start-ups are under significant pressure to keep costs low. Such constraints may result in a focus on production at the expense of attention to compliance with standards for occupational safety and health. The expansion in commercial office space in WA has outpaced the growth of the workforce and may increase work demands.⁴¹ Janitors have recently reported increasing workloads^{42–44} which may put them at increased risk of work-related injuries.

Janitors face what is described by the National Institute for Occupational Safety and Health (NIOSH) as “overlapping vulnerabilities.”⁴⁵ This refers to a situation where, in addition to occupational hazards, a variety of factors may combine to affect work and health experiences and increase risk of work-related injury and illness (WRIL). For janitors, these factors include being low-wage and low-status,⁴⁶ often women,^{1,12–14,16} being older age workers (often over 40),^{12,13,16} with a large proportion of immigrants,^{10,14} and facing language barriers.¹³

The janitorial workforce is also racially and ethnically diverse, and many of these workers have historically faced discrimination in health diagnoses and health care quality which may increase their proportion of comorbidities and compound risk of and difficulty in recovering from, WRIL.^{47–52} The combination of limited knowledge of and access to training, healthcare and other workplace rights and benefits,¹⁰ as well as lower bargaining power to demand safe work,⁴⁶ places janitors at high risk of occupational injury. Both California and

Oregon have passed legislation regarding training and protections for janitors.^{53,54}

In WA, analyses of WC claims and the state's Behavioral Risk Factor Surveillance System (BRFSS) data by occupation have consistently identified janitors as a profession at high risk for WRILI compared to other workers across a wide range of injury types, and in need of further attention to reduce this burden.^{1–3,55} In 2018, the Washington State Legislature funded the creation of the Washington State Janitorial Workload Study (JWS) to address the high injury rates for janitors.⁵⁶ The specific aims of the JWS were to: quantify the physical demands of common janitorial tasks, assess the safety and health needs of janitors, identify potential risk factors associated with increased risk of injury, and measure workload strain. The JWS statewide survey was created to help fulfill these aims (along with other study components, such as in-person physical exposure assessments, an employer survey, and focus groups).

2 | MATERIALS AND METHODS

2.1 | Population

A statewide survey of janitors was conducted from November 4, 2019, through February 4, 2020, for all eligible janitors in WA. Eligible survey respondents were those currently employed as commercial janitors or custodians, or had been so employed in the past year, and were 18 years of age or older. A professional survey research firm administered the survey through mail, phone, and web modes. The survey was available in English, Spanish, Vietnamese, Somali, Traditional Chinese, Simplified Chinese, Russian, and Amharic.

2.2 | Data sources and linking

The janitorial workforce is difficult to survey because janitors work across industries, in a variety of employment arrangements, and with varying work organization, tenure, and employer sizes. Additionally, records on employment are limited as there are no state licensing requirements, registries, certifications, associations, or other publicly accessible lists of janitors with necessary contact information. As a result, a novel data linkage procedure combining WA Employment Security/Unemployment Insurance data (ESD), WA WC claims data, union enrollment data, and WA driver's licensing data was created to capture a broad sample of janitors across WA (Table 1). Relying on a single source would have limited the sample in size and generalizability (e.g., only injured janitors from WC, only union janitors from union membership rolls).

The multisource linking process yielded many potential janitors, but was limited by the available data, and likely did not include certain groups of janitors such as self-employed owners of cleaning businesses without other employees or employing only family members (e.g., franchisees), janitors employed directly by nonjanitorial-service firms (outside of those included in WC), and janitors employed in the underground economy.

Due to limitations and missing data elements in each of the data sources used (Table 1), the linkage process was necessary to compile a usable sample of janitors. Data from ESD (74% of the initial raw sample, Table 1) identified janitorial firms and janitors within NAICS code 561720—Janitorial Services, but did not include contact or demographic information about individuals, nor occupation or risk class information to better identify janitors within this or other industry classifications. This data was linked to the Department of Licensing name and contact information for WA residents with valid drivers' licenses, which could be matched to the names of janitors identified by the ESD data. This provided data only for those with a valid license, and this information is not always up-to-date.

For janitors who are not employed by Janitorial Services (NAICS 561720) firms, data from sources other than ESD were needed. To capture janitors directly employed by other types of businesses (e.g., janitors employed in a manufacturing company, janitors employed in agricultural warehouses), we used risk class information from WA WC data. Risk class is a WA-specific classification system that combines industry and occupation information to group workplaces by similar risk level for industrial insurance purposes. For example, a janitor directly employed by a manufacturing company would have the same NAICS code (industry) as any other employee working for the same firm regardless of occupation, but they would be assigned different risk classes, and the employer would pay WC premiums based on their risk classes. ESD data does not include occupational information, so it cannot be used to differentiate between janitors and those doing non-janitorial work at the same firm. However, this WC information is only available for injured janitors. Employers pay premiums based on the number of employees by risk class, but the employer account database does not include names or contact information for individual workers. When a worker is injured and files a claim, this information becomes available. We identified janitors from the WC data by risk class 6602—Janitorial Services and Pest Control, specifically sub-classes 6602-03—Janitorial Cleaning Services, Not Otherwise Classified (N.O.C.), and 6602-05—Janitors, N.O.C. This excludes other workers in the risk class such as contract window washing services, residential janitors, pest control, portable cleaning and washing, and street and building decoration workers. The WA WC system is a rich data source and provides name and contact information, as well as language preference data when available. Approximately 5% of the total raw sample data (Table 1) sent to the survey research firm were from WC data (before the addition of union membership rolls, and before data cleaning and sample selection).

The final data source included was membership data from a labor union that represents property service workers (including janitors). A data sharing agreement was established between the union and the survey research firm; name, contact information, and language preference information were sent directly to the survey research firm.

2.3 | Sampling

The survey research firm that was contracted worked with an Institutional Review Board trained and approved staff member who

TABLE 1 Washington state janitorial workload study, 2019–2020 statewide survey sample information

Data source	Employment security department (ESD) data	Department of licensing (DOL) data	WA workers' compensation claims	Union membership rolls	(1) Total raw sample	(2) After data cleaning	(3) 1st sample	(4) 2nd sample
% of total raw sample (1)	74%	Not applicable/matching only	5%	21%	20,129 ^a	16,664 ^b	12,847	1263
Identification process ^c	Identified workers employed by janitorial firms within NAICS code 561720, Janitorial Services	ESD data matched to WA drivers' license holders by name	Workers compensation claims data for janitors, identified by risk class 6602, specifically 6602-03 and 6602-05	Janitors represented by the union				
Variables used, strengths and limitations	Employee names. No individual contact information. Limited to workers employed by Janitorial Services firms (industry based)—does not identify janitors directly employed by other types of companies	Name and contact information. Limited to those with a valid drivers' license. Many out-of-date addresses. Does not include employment information, can only be used to provide contact information via name matching	Name and contact information. Not limited to industry coding (NAICS)—this allows us to identify janitors who work outside of 'Janitorial Services—NAICS 561720' (e.g., janitors directly employed by other companies). May include language preference. Limited to injured workers who filed a claim	Employment, name, and contact information. Language preference. Unions represent only a small percentage of janitors. Union members may differ from other janitors in working conditions, wages, demographics, work organization, and other factors				

^aData linkage from ESD, DOL, WA WC $n = 15,830$; union list $n = 4,299$.

^bDuplicate data across lists removed = 2024. Data cleaning/removing cases where there was no usable contact information = removed 1441. Final selection loaded 16,664 cases for sampling.

^cThe authors did not have access to personal identifiers during the data linkage process. The survey research firm selected the samples from the pool of available potential respondents after data cleaning.

was not involved in the JWS to compile the data for sampling. An initial survey sample pool of 20,129 potential janitors (Table 1) was created, and after removal of duplicates and janitors without usable contact information, the sample was reduced to 16,664 potential janitors. The authors were not privy to the methods used to select janitors. The first sample of 12,847 potential janitors was selected, which was followed about a month later by the drawing of a second sample of 1263 respondents from the remaining previously uncontacted pool of potential janitors to increase the total number of responses.

2.4 | Survey administration

Potential respondents were contacted by mail (by the survey research company) with prenotification letters and informed consent information, including information on how to opt-out if they did not wish to be contacted further. Following this initial contact, potential respondents were sent survey packets with information on how to take the survey in multiple languages. Janitors were provided with unique personal identification numbers (pins) so that only those identified by the sample as verifiable janitors or custodians had access. Additional janitors who found out about the survey through other means and wanted to participate were able to take it by contacting the research team and having their name and employment verified, and upon confirmation, they were given pin numbers for access. Several weeks after the full questionnaire packet mailings, if the potential janitors had not opted out, nor mailed in a reply, and if there was a valid phone number, the survey research company had interviewers call to attempt to interview potential janitors by phone. Janitors who participated were asked if they were currently employed as janitors (or had been in the last year), as part of the screening process, along with confirming they were over age 18.

Respondents could participate in the survey by returning the printed questionnaire in an included postage-paid envelope, by filling it out online, or by calling the provided telephone numbers. While the paper survey form was only mailed in English, as no available data source could predict language preference for the entire sample, information on how to take the survey was provided in each of the supported languages. The online method was available in English and Spanish, while phone numbers were available for all others. The languages supported were chosen based on prior analyses of WC claims by janitors (the initial WC form at claim initiation allows workers to select a preferred language to communicate with the agency, though it is optional), and by consultation with a labor organization that represents janitors in WA.

2.5 | Questionnaire

The survey instrument covered a wide range of topics about janitorial workload, work organization, job demands and control, physical load assessments, employment situation, health and safety concerns

(including work-related injury, depression, and physical and chemical exposures), safety climate/culture, training, employer policies, discrimination, and demographics. The final questionnaire was developed in consultation with the entire JWS team of multidisciplinary researchers. The survey topics were designed to identify hazards and characterize outcomes and working conditions, and to supplement the workload assessment component of the study, which includes in-person data collection. Before the survey, we conducted exploratory focus groups (in English and Spanish) with janitors across the state to help inform survey development and identify topic areas.

Validated, existing measures or existing questions were used or adapted where freely available and relevant, including but not limited to: the San Diego Labor Trafficking Survey Questionnaire,⁵⁷ the NIOSH Quality of Worklife Module, General Social Survey 2010, Section D,⁵⁸ the NIOSH Generic Job Stress Questionnaire,^{59,60} the Job Content Questionnaire,⁶¹ and the Everyday Discrimination Scale.⁶² The work-related injury or illness question (WRIL) was adapted from a BRFSS Worker Health Module.⁶³ The question asked: "In the past 12 months, have you been injured while performing work as a janitor, or has a doctor or other medical professional told you that you have a work-related illness?" The questions about WC claim filing were also from the BRFSS Worker Health module.⁶³ Other questions adapted from the BRFSS include those on sleep and self-reported general health.⁶⁴ Questions on specific geographic origins were adapted from the U.S. Census Bureau's American Community Survey.⁶⁵ The questionnaire is available upon request.

The questionnaire was pre- and pilot-tested on selected staff, janitors, and finally by interviewers from the survey research company. Pre- and pilot-testing were done with a small group of volunteers running through the questionnaire in-person and over the phone. This iterative process tested the questionnaire's length and question comprehension and answerability. Questions were kept, edited, or discarded based on how they performed in the testing phase and input from the pilot-testers. Both pre- and pilot-testing were done in multiple languages, with edits made for timing, clarity, and cultural sensitivity. The final versions of the questionnaire for use by phone, web, and mailing were approved by the Washington State Institutional Review Board. All staff and interviewers from the survey research firm who had access to personally identifying information were trained and certified on human subjects protection, as well as completing confidentiality, privacy, and nondisclosure training and a project specific briefing.

2.6 | Participation and incentive

Completed interviews took a mean length of 62 min (all methods), and median time to complete was 46 min. Telephone mean and median completion times were both around 50 min, but time for completion of the online version of the questionnaire was more varied (77 and 37 min mean and median, respectively). Two response rates and four cooperation rates were calculated, following American Association of Public Opinion Research (AAPOR) standards.⁶⁶ The

response rates were 4.2%–4.5%, primarily due to the influence of cases of unknown eligibility (e.g., line busy, no response to mailing and no phone number, no answer, mailed but no response; $n = 11,880$ for this category). However, the cooperation rates (which exclude those of unknown eligibility), ranged from 38.9% to 48.6%.

To encourage participation and compensate janitors for the time spent taking the survey, a \$15 incentive (in the form of a preloaded Visa card), was provided to participating janitors regardless of how much of the survey they completed. Janitors who wanted to receive the incentive provided their information directly to the survey company, whose staff handled distributing incentives. The authors and JWS staff did not have access to the participants' contact information, which was destroyed after mailing the incentive, or to be destroyed within 1 year of the survey if the respondents gave consent to be contacted again within that time frame.

All participants received informed consent information (available in all languages) and all research activities (questionnaires, incentives, consent documents, scripts, and advertising) were approved by the Washington State Institutional Review Board.

2.7 | Data analysis

Throughout this analysis, the results of questions with less than 10 responses are suppressed and analysis was restricted to complete response files only ($n = 620$; an additional 39 were excluded as partials, and 1 was removed for ineligibility, overall $n = 660$). Respondents could specify other gender options, but analysis was restricted to male or female because of the small number of other responses. We present the data stratified by gender binary to explore possible differences in WRIL and risk factors, as female janitors in WA have been previously shown to have significantly higher injury rates.¹ A mutually exclusive race/ethnicity variable (White, American Indian/Alaskan Native, Asian/Pacific Islander, Black, Latino, and More than one race) was used in analysis and was created by combining answers to several questions on race and ethnicity. "Latino" took precedence over racial categories specified when in combinations (e.g., Latino for ethnicity and White for race would be counted as Latino).

Where open text fields were provided for respondents, verbatim responses were collected for coding by the research staff as applicable (e.g., grouping chemicals and cleaning products, common themes for why not filed a WC claim if injured). Body mass index (BMI) was calculated from self-report fields for height and weight ($BMI = [kg/m^2]$), according to the Centers for Disease Control and Prevention (CDC) categories. The Patient Health Questionnaire-2⁶⁷ (PHQ-2) set of screening questions was used to indicate possible depression when the combined score was three or higher.

Descriptive statistical analyses were conducted and are presented to characterize the respondents, work organization factors, and safety and health issues. Exact binomial proportions and 95% confidence intervals (CIs) are presented for these factors by gender binary. Post-hoc analyses of categorical variables were performed using Chi-square tests. Continuous variables (age, BMI, PHQ-2 score, days) were analyzed by means (with 95% CIs) and *t* tests.

Comparison data for janitors' demographic information were gathered via the NIOSH Employed Labor Force (ELF) query tool using Current Population Survey (CPS) estimates⁶⁸ for Janitors and Building Cleaners (Bureau of Census (BOC) occupation code: 4220); and the U.S. Census Bureau's Quarterly Workforce Indicators (QWI) tool⁶⁹ for workers employed in NAICS 5617 Services to Buildings and Dwellings (which includes janitors). While providing useful estimates for comparison, the data in these systems differ in scope from our sample. NAICS-based data (QWI) include other occupations in the same industry, and CPS data include types of workers (e.g., government employees), that our sample would likely not capture. Public-sector janitors included in the CPS may have better wages and protections than workers in contract janitorial firms, such as the majority of those in our sample.

Survey questions selected for this analysis were chosen to provide an overview of major questionnaire topics, to provide items for inclusion in modelling which factors impact WRIL risk in this population, and to suggest further analyses. Binary variables were created for WRIL (in the past 12 months, as diagnosed by a healthcare professional), gender, annual household income (\geq / $<$ \$50,000), union membership, having multiple jobs, whether their shifts change, belief that the quality of their tools negatively impacted their job, amount of sleep (greater than or equal to/less than 7 h in a 24-h period), and Patient Health Questionnaire-2 (PHQ-2) score (≥ 3 , or < 3). The remaining variables tested in the model were categorical variables (age category, race and ethnicity, marital status, education, tenure, hours worked). Poisson regression with robust variance was used to estimate the relative risk of WRIL for janitors, with 95% CIs. Statistical analysis was conducted with SAS 9.4 (SAS Institute Inc.).

3 | RESULTS

There were 620 complete response files from Washington State janitors available for analysis. We characterized respondents and explored potential factors involved in WRIL risk. Table 2 presents survey information and demographic characteristics of respondents. Of the WA janitors surveyed, over half were female (57%), had worked as a janitor for less than 5 years overall (54%), and made less than \$50,000 in annual household income (83%) (Table 2). Almost half (43%) of Janitors were nonwhite (Table 2), and janitors came from at least 30 countries and sovereign Indigenous nations (data not shown).

Table 2 presents data on work arrangements and work organization factors. There were significant differences by gender in union representation ($p < .01$), hours worked ($p < .01$), changing shifts ($p < .01$), adequate quality cleaning supplies ($p < .03$), access to paid vacation leave ($p < .01$) access to paid sick leave ($p < .02$), and the ability to take regular breaks ($p < .04$) (Table 3). A higher proportion of women reported working at least two jobs or more ($p < .01$) (Table 3), which may indicate that women have more fractured work arrangements.

Table 4 presents health and safety issues. Twenty-one percent of janitors reported they had a WRIL in the past 12 months (healthcare

TABLE 2 Survey administration and demographic characteristics, Washington state janitors, 2019–2020

	Total		Gender ^a			
	n	%, 95% CI	Female n	%, 95% CI	Male n	%, 95% CI
Respondents	620	100	348	57.1 (53.0–61.0)	262	43.0 (39.0–47.0)
Survey type ^b						
Mail	388	62.6 (58.6–66.4)	219	62.9 (57.6–68.0)	163	62.2 (56.0–68.1)
Phone	142	22.9 (19.7–26.4)	78	22.4 (18.1–27.2)	62	23.7 (18.6–29.2)
Web	90	14.5 (11.8–17.5)	51	14.7 (11.1–18.8)	37	14.1 (10.1–18.3)
Language administered						
English	532	85.8 (85.1–90.4)	291	83.6 (79.3–87.4)	232	88.6 (84.1–92.1)
Spanish	41	6.6 (4.9–9.1)	-	9.8 (7.1–13.8)	≤10	-
Vietnamese	32	5.2 (3.7–7.4)	13	3.7 (2.1–6.5)	19	7.3 (4.5–11.3)
Somali	≤10	-	≤10	-	≤10	-
Chinese-traditional	≤10	-	≤10	-	≤10	-
Chinese-simplified	≤10	-	≤10	-	≤10	-
Amharic	≤10	-	≤10	-	≤10	-
Gender						
Female	348	56.5 (52.5–60.5)	-	-	-	-
Male	262	42.5 (38.6–46.6)	-	-	-	-
Transgender, other, or gender nonconforming	≤10	-	-	-	-	-
Age categories						
18–29	96	17.8 (14.7–21.3)	56	18.3 (14.1–23.1)	40	17.3 (12.7–22.8)
30–39	122	22.6 (19.2–26.4)	80	26.1 (21.3–31.5)	41	17.8 (13.1–23.3)
40–49	95	17.6 (14.5–21.1)	64	20.9 (16.5–25.9)	30	13.0 (8.9–18.0)
50–59	106	19.7 (16.4–23.3)	62	20.3 (15.9–25.2)	44	19.1 (14.2–24.7)
60+	120	22.3 (18.8–26.0)	44	14.4 (10.7–18.8)	76	32.9 (26.9–39.4)
Mean years (95% CI)	45	(43.8–46.3)	42.8	(41.3–44.2)	48.1	(46.1–50.1)
Race/ethnicity						
Asian/Pacific Islander	68	11.0 (8.6–13.7)	24	6.9 (4.5–9.6)	44	16.8 (12.5–21.9)
Black/African American	69	11.1 (8.8–13.9)	34	9.8 (6.9–13.4)	34	13.0 (9.2–17.7)
Latino/Hispanic	82	13.2 (10.7–16.2)	53	15.2 (11.6–19.4)	28	10.7 (7.2–15.1)
White	353	57.0 (52.9–60.9)	217	62.4 (57.0–67.5)	133	50.8 (44.5–56.9)
Other/More than one	39	6.3 (4.5–8.5)	14	4.0 (2.2–6.7)	20	7.6 (4.7–11.5)
American Indian, Alaska Native	≤10	-	≤10	-	≤10	-
Overall tenure as a janitor						
<1 year	62	10.0 (7.8–12.6)	31	8.9 (6.1–12.4)	30	11.5 (7.9–15.9)
1–4 years	273	44.0 (40.1–48.0)	161	46.3 (40.9–51.7)	107	40.8 (34.8–47.1)
5–9 years	117	18.9 (15.9–22.2)	77	22.1 (17.9–26.9)	39	14.9 (10.8–19.8)
10–24 years	131	21.1 (18.0–24.6)	67	19.3 (15.2–23.8)	62	23.7 (18.6–29.3)
More than 25 years	37	6.0 (4.2–8.1)	12	3.5 (1.8–5.9)	24	9.2 (6.0–13.3)
Mean months tenure (95% CI)	89.2	(81.4–97.0)	79.8	(70.9–88.7)	101.5	(87.6–115.5)

(Continues)

TABLE 2 (Continued)

	Total		Gender ^a			
	n	%, 95% CI	Female n	%, 95% CI	Male n	%, 95% CI
Marital status						
Single	238	39.4 (35.5–43.4)	126	36.7 (34.9–46.1)	109	42.4 (38.3–51.2)
Married	253	41.9 (37.9–45.9)	140	40.8 (39.3–50.6)	112	43.6 (39.5–52.4)
Divorced	69	11.4 (9.0–14.2)	46	13.4 (11.0–19.2)	23	9.0 (6.1–13.8)
Other	44	7.3 (5.3–9.7)	31	9.0 (6.2–12.4)	13	5.1 (2.7–8.3)
Body mass index (BMI)^c						
Underweight, <18.5	11	2.1 (1.0–3.7)	≤10	-	≤10	-
Healthy normal, 18.5 to <25	195	36.7 (32.6–41.0)	111	37.2 (31.7–43.0)	84	36.2 (30.0–42.8)
Overweight, 25 to <30	181	34.1 (30.1–38.3)	86	28.9 (23.8–34.4)	94	40.5 (34.1–47.1)
Obese, 30+	144	27.1 (23.4–31.1)	94	31.5 (26.3–37.2)	50	21.6 (16.4–27.4)
Mean BMI (95% CI)	27.6	(27.0, 28.2)	28.1	(27.2, 28.9)	27.0	(26.3, 27.8)
Education						
No formal schooling	≤10	-	≤10	-	≤10	-
Elementary school	41	6.8 (5.0–9.2)	30	8.8 (6.1–12.4)	11	4.2 (2.2–7.5)
Some high school	50	8.3 (6.3–10.8)	29	8.5 (5.8–12.1)	19	7.3 (4.5–11.3)
High school graduate or GED	216	35.7 (32.2–40.0)	123	36.2 (31.3–41.8)	92	35.3 (29.8–41.8)
Some college	219	35.7 (32.6–40.5)	114	33.5 (28.7–39.0)	105	40.2 (34.7–47.0)
College graduate	74	12.2 (9.8–15.2)	42	12.4 (9.1–16.4)	31	11.9 (8.3–16.6)
Annual household income						
Less than \$10,000	55	10.9 (8.4–14.0)	41	14.8 (10.8–19.5)	13	5.8 (3.1–9.8)
\$10,000 to <\$25,000	167	33.3 (29.2–37.6)	103	37.2 (31.5–41.2)	64	28.7 (22.9–35.1)
\$25,000 to <\$50,000	196	39.0 (34.8–43.5)	90	32.5 (27.0–38.4)	105	47.1 (40.4–53.9)
\$50,000 to <\$75,000	51	10.1 (7.7–13.1)	21	7.6 (4.8–11.4)	30	13.5 (9.3–18.6)
\$75,000+	33	6.6 (4.6–9.1)	22	7.9 (5.0–11.8)	11	4.9 (2.5–8.7)

Note: Bold font indicates significant at $\alpha = .05$.

^aResults by gender exclude transgender, other, or gender nonconforming respondents (included in the total results), but this can be indirectly calculated. Results by gender may differ from the overall total, due to the exclusions by gender and missing responses for individual questions.

^bLanguages available varied by survey type: mailed questionnaires were English-only, web survey was English & Spanish, the phone version was available in English, Spanish, Vietnamese, Somali, Chinese (Traditional and Simplified), Russian, and Amharic.

^cCalculated according to CDC guidelines.

provider diagnosed), and of these, only 45% filed a WC claim for their injury or illness, with a higher proportion of women reporting WRIL ($p < .04$), though there was no significant difference between genders in claim filing (Table 4). Women also reported consistently higher percentages of pain in various body parts as compared to men ($p < .05$ for each). While the mean hours of sleep reported were the same by gender (Table 4), women reported feeling less rested, with higher mean days without enough rest ($p < .001$). Janitors reported a variety of specific cleaning products caused eye, skin, and/or breathing problems—which occurred in about 20% of janitors, regardless of gender (Table 4). Nearly 20% of janitors scored a 3 or above on the PHQ-2 screening tool questions for depression

(Table 4) indicating a high rate of potential depression and the need for additional screening in this population. Slip, trip, and fall hazard exposures were “somewhat likely” or more frequently for approximately 30% of janitors, and there was no significant difference in these proportions between men and women, nor for staffing concerns or overall job satisfaction (Table 4). Janitors were also often physically and mentally exhausted after their work shifts, with women more so than men (Table 4).

As a follow-up to the WC filing question (Table 4), janitors who were injured or made ill on the job in the past 12 months but did not file a claim for their WRIL (54.8%, Table 4) were asked for their reasons why they did not file a claim (open text), which were grouped

TABLE 3 Select work organization factors, Washington state janitors, 2019–2020

	Total		Gender ^a			
	n	%, 95% CI	Female n	%, 95% CI	Male n	%, 95% CI
	620	100	348	57.1 (53.0–61.0)	262	43.0 (39.0–47.0)
Are/were you a union member?						
No	419	70.3 (66.5–74.0)	265	78.9 (74.1–83.1)	147	58.6 (52.2–64.7)
Yes	177	29.7 (26.1–33.5)	71	21.1 (16.9–25.9)	104	41.4 (35.3–47.8)
How many hours per week normally worked at this janitorial job?						
1–39 h/week	336	54.6 (50.6–58.6)	219	63.3 (58.0–68.4)	112	43.1 (37.0–49.3)
40 h/week	231	37.6 (33.7–41.5)	105	30.4 (25.5–35.5)	123	47.3 (41.1–53.6)
More than 40 h/week	48	7.8 (5.8–10.2)	22	6.4 (4.0–9.5)	25	9.6 (6.3–13.9)
Employment arrangement:						
Works for a company that cleans buildings (that they don't own)	492	80.7 (77.3–83.8)	277	80.3 (75.7–84.4)	206	80.5 (75.1–85.1)
Works for company that owns the buildings (that I clean/ed)	60	9.8 (7.6–12.5)	33	9.6 (6.7–13.2)	27	10.6 (7.1–15.0)
Independent contractor, consultant, or freelance worker	31	5.1 (3.5–7.1)	17	4.9 (2.9–7.8)	14	5.5 (3.0–9.0)
Other (please describe)	24	3.9 (2.5–5.8)	-	5.2 (3.1–8.1)	≤10	-
Paid by a temporary agency	≤10	-	≤10	-	≤10	-
How were you paid for your work?						
Salaried	33	5.4 (3.7–7.5)	14	4.1 (2.2–6.7)	19	7.3 (4.5–11.2)
Paid by the hour	556	90.5 (88.0–92.8)	317	91.9 (88.5–94.5)	230	88.5 (83.9–92.1)
Other (please describe)	25	4.1 (2.7–6.0)	14	4.1 (2.2–6.7)	11	4.2 (2.1–7.4)
Do/Did your shifts change at this job?						
No	435	75.5 (71.2–79.0)	235	71.9 (66.7–76.7)	200	80.3 (74.8–85.1)
Yes	141	24.5 (21.0–28.1)	92	28.1 (23.3–33.3)	49	19.7 (14.9–25.2)
How would you rate the quality of the tools, machinery, or equipment used in your janitorial work?						
Poor	52	8.6 (6.5–11.2)	30	8.8 (6.0–12.4)	22	8.6 (5.5–12.7)
Fair	151	25.1 (21.7–28.8)	89	26.2 (21.6–31.2)	60	23.4 (18.4–29.1)
Good	205	34.1 (30.3–38.1)	111	32.7 (27.7–37.9)	91	35.6 (29.7–41.8)
Very good	135	22.5 (19.2–26.0)	75	22.1 (17.8–26.9)	60	23.4 (18.4–29.1)
Excellent	58	9.7 (7.4–12.3)	35	10.3 (7.3–14.0)	23	9.0 (5.8–13.2)
Does/Did the quality of your tools, machinery, or equipment, negatively impact your job? (e.g., slow you down or make you work harder?)						
Yes	218	37.2 (33.3–41.3)	130	39 (33.8–44.5)	87	34.9 (29.0–41.2)
No	368	62.8 (58.7–66.7)	203	61 (55.5–66.2)	162	65.1 (58.8–71.0)
Are/Were you given adequate <u>quality</u> cleaning supplies (e.g., the right cleaning supplies you need for the job)?						
Yes	503	85.5 (82.4–88.3)	278	82.7 (78.3–86.6)	220	89.1 (84.5–92.7)
No	85	14.5 (11.7–17.6)	58	17.3 (13.4–21.7)	27	10.9 (7.3–15.5)

(Continues)

TABLE 3 (Continued)

	Total		Gender ^a			
	n	%, 95% CI	Female n	%, 95% CI	Male n	%, 95% CI
Are/Were you given adequate <u>quantity</u> of cleaning supplies (e.g., enough cleaning chemicals/bag liners/etc.)?						
Yes	511	86.2 (83.1–88.9)	289	85.8 (81.6–89.5)	217	86.5 (81.6–90.4)
No	82	13.8 (11.2–16.9)	48	14.2 (10.7–18.4)	34	13.5 (9.6–18.4)
Do you currently work at another job? (2nd job or more)						
Yes	169	28.2 (24.6–32.0)	109	32.2 (27.2–37.4)	58	22.7 (17.7–28.3)
No	431	71.8 (68.1–75.4)	230	67.9 (62.6–72.8)	198	77.3 (71.7–82.3)
Do/Did you have access to paid vacation leave?						
Yes	302	50.1 (46.0–54.2)	146	43.2 (37.9–48.7)	152	59.4 (53.1–65.5)
No	301	49.9 (45.9–54.0)	192	56.8 (51.3–62.2)	104	40.6 (34.6–46.9)
Are/Were you discouraged from taking paid sick leave? ^b						
Yes	167	28.0 (24.5–31.8)	90	27.0 (22.3–32.1)	73	28.7 (23.3–34.7)
No	328	55.0 (50.9–59.1)	174	52.2 (46.7–57.7)	150	59.1 (52.7–65.2)
No paid sick leave	101	17.0 (14.0–20.2)	69	20.7 (16.5–25.5)	31	12.2 (8.5–16.9)
Do/Did you get to take your regularly scheduled (mandated by law) breaks & lunch time?						
Yes	431	71.8 (68.1–75.4)	230	68.4 (63.2–73.4)	194	75.8 (70.1–80.9)
Sometimes	96	16.0 (13.2–19.2)	56	16.7 (12.8–21.1)	40	15.6 (11.4–20.7)
No	73	12.2 (9.7–15.1)	50	14.9 (11.3–19.1)	22	8.6 (5.5–12.7)
Can/Could you use the bathroom whenever you need (ed) to?						
Yes	583	96.2 (94.4–97.6)	327	96.2 (93.6–98.0)	247	96.1 (93.0–98.1)
No	23	3.8 (2.4–5.6)	13	3.8 (2.1–6.5)	10	3.9 (1.9–7.0)
How often are/were there not enough people or staff to get all the work done?						
Never (0 days/wk)	203	37.7 (33.6–42.0)	107	35.8 (30.4–41.5)	94	40.7 (34.3–47.3)
Rarely (1–2 days/wk)	132	24.5 (21.0–28.4)	75	25.1 (20.3–30.4)	54	23.4 (18.1–29.4)
Sometimes (2–3 days/wk)	93	17.3 (14.2–20.8)	52	17.4 (13.3–22.2)	41	17.8 (13.1–23.3)
Often (4–5 days/wk)	52	9.7 (7.3–12.5)	34	11.4 (8.0–15.5)	16	6.9 (4.0–11.0)
Always (every day)	58	10.8 (8.3–13.7)	31	10.4 (7.2–14.4)	26	11.3 (7.5–16.1)
All in all, I am/was satisfied with my job as a janitor.						
Strongly disagree	36	5.9 (4.2–8.1)	23	6.7 (4.3–9.9)	13	5.1 (2.7–8.5)
Disagree	60	9.8 (7.6–12.5)	38	11.1 (7.9–14.9)	22	8.6 (5.4–12.7)
Neither agree nor disagree	135	22.1 (18.9–25.6)	75	21.8 (17.6–26.5)	57	22.2 (17.3–27.8)
Agree	256	42.0 (38.0–46.0)	138	40.1 (34.9–45.5)	114	44.3 (38.2–50.7)
Strongly agree	123	20.2 (17.1–23.6)	70	20.4 (16.2–25.0)	51	19.8 (15.2–25.3)

Note: Bold font indicates significant at $\alpha = .05$.

^aResults by gender exclude Transgender, Other, or Gender Nonconforming respondents (included in the total results), but this can be indirectly calculated. Results by gender may differ from the overall total, due to the exclusions by gender and missing responses for individual questions.

^bAccording to the Revised Code of Washington (RCW) 49.46.200 and 49.46.210, every employer must provide access to paid sick leave for their employees, beginning January 1, 2018

TABLE 4 Select health and safety issues, Washington state janitors, 2019–2020

	Total		Gender ^a			
	n	%, 95% CI	Female n	%, 95% CI	Male n	%, 95% CI
	620	100	348	57.1 (53.0–61.0)	262	43.0 (39.0–47.0)
Work-related injury/illness in the past 12 months? (Doctor/healthcare professional diagnosed)						
No	461	79.4 (75.9–82.6)	256	76.7 (71.7–81.1)	205	83.7 (78.4–88.1)
Yes	118	20.6 (17.4–24.1)	78	23.4 (18.9–28.3)	40	16.3 (11.9–21.6)
IF YES injured, did you file a workers' compensation claim?						
Yes	52	45.2 (35.9–54.8)	34	45.3 (33.8–57.3)	17	46.0 (29.5–63.1)
No	63	54.8 (45.2–64.1)	41	54.7 (42.8–66.2)	20	54.1 (36.9–70.5)
In general, would you say your health is:						
Excellent	56	9.1 (7.0–11.7)	23	6.7 (4.3–9.8)	32	12.3 (8.5–16.9)
Very good	188	30.6 (27.0–34.4)	112	32.5 (27.6–37.7)	73	28.0 (22.6–33.8)
Good	252	41.0 (37.1–45.0)	139	40.3 (35.1–45.7)	109	41.8 (35.7–48.0)
Fair	103	16.8 (13.9–20.0)	61	17.7 (13.8–22.1)	41	15.7 (11.3–20.1)
Poor	16	2.6 (1.5–4.2)	-	2.9 (1.4–5.3)	≤10	-
In the last 12 months have you had trouble (ache/pain/ discomfort/numbness) in your: ^b						
Neck	233	41.1 (37.0–45.3)	153	46.9 (41.4–52.5)	76	32.6 (26.6–39.1)
Shoulders	268	46.5 (42.4–50.7)	171	51.7 (46.1–57.2)	93	39.2 (33.0–45.8)
Elbows	115	21.3 (18.0–25.0)	73	23.9 (19.3–29.1)	38	16.9 (12.2–22.4)
Wrists/hands	262	46.8 (42.6–51.0)	182	56.7 (51.1–62.2)	73	31.7 (25.8–38.2)
Lower Back	344	58.8 (54.7–62.8)	215	64.4 (60.0–69.5)	121	49.8 (43.3–56.3)
Knee	210	37.4 (33.4–41.6)	138	43.0 (37.5–48.6)	68	29.3 (23.5–35.6)
Ankles/feet	220	39.7 (35.6–43.9)	139	43.6 (38.1–49.2)	78	34.4 (28.2–40.9)
Do any of the cleaning products you use cause you to have any: ^b						
Eye irritation?	111	18.7 (15.6–22.0)	64	19.1 (15.0–23.7)	47	18.7 (14.0–24.0)
Skin problems?	125	21.0 (17.8–24.5)	77	22.9 (18.5–27.7)	47	18.7 (14.1–24.1)
Breathing problems?	106	17.9 (14.9–21.2)	68	20.3 (16.1–25.0)	37	14.8 (10.6–19.8)
How likely are/were you to slip, trip, or fall during your normal janitorial work activities?						
Not at all	228	37.3 (33.5–41.3)	125	36.3 (31.3–41.7)	101	39.2 (33.2–45.4)
A Little Likely	194	31.8 (28.1–35.6)	106	30.8 (26.0–36.0)	84	32.6 (26.9–38.7)
Somewhat Likely	94	15.4 (12.6–18.5)	53	15.4 (11.8–19.7)	39	15.1 (11.0–20.1)
Likely	65	10.6 (8.3–13.4)	38	11.1 (7.9–14.9)	26	10.1 (6.7–14.4)
Extremely Likely	30	4.9 (3.3–6.9)	-	6.4 (4.1–9.5)	≤10	-
On average, how many hours of sleep do you get in a 24-hour period?						
<7 h	268	44.5 (40.5–48.6)	147	43.6 (38.3–49.1)	119	46.5 (40.3–52.8)
7 h or more	334	55.5 (51.4–59.5)	190	56.4 (50.9–61.8)	137	53.6 (47.2–59.8)
Mean hours, all (95% CI)	6.9	(6.8, 7.0)	6.9	(6.8, 7.1)	6.9	(6.7, 7.1)

(Continues)

TABLE 4 (Continued)

	Total		Gender ^a			
	n	%, 95% CI	Female		Male	
	n	%, 95% CI	n	%, 95% CI	n	%, 95% CI
About how many days have you felt you did not get enough rest or sleep? (During the last 30 days)						
None	157	26.8 (23.2–30.5)	66	19.9 (15.7–24.6)	91	36.8 (30.8–43.2)
<10	200	34.1 (30.2–38.1)	121	36.5 (31.3–41.9)	76	30.8 (25.1–36.9)
10–19	87	14.8 (12.0–18.0)	53	16.0 (12.2–20.4)	31	12.6 (8.7–17.3)
20 or more	143	24.4 (20.9–28.0)	92	27.7 (23.0–32.9)	49	19.8 (15.1–25.4)
Mean days, all (95% CI)	9.6	(8.7, 10.4)	10.7	(9.6, 11.9)	7.8	(6.6, 9.1)
Patient Health Questionnaire-2 (PHQ-2)-depression screening tool ^c						
0–2	483	80.9 (77.5–84.0)	207	79.0 (74.3–83.2)	210	84.0 (78.9–88.3)
≥3 need for further depression screening	114	19.1 (16.0–22.5)	71	21.0 (16.8–25.7)	40	16.0 (11.7–21.1)
Mean score, all (95% CI)	1.3	(1.2, 1.4)	1.4	(1.2, 1.6)	1.1	(0.9, 1.3)
How often are/were you mentally exhausted after work?						
Never	207	33.9 (30.1–37.8)	107	31.0 (26.2–36.2)	99	38.5 (32.5–44.8)
Some of the time	238	39.0 (35.1–43.0)	125	36.2 (31.2–41.6)	109	42.4 (36.3–48.7)
Often	98	16.0 (13.2–19.2)	66	19.1 (15.1–23.7)	29	11.3 (7.7–15.8)
Always	68	11.1 (8.8–13.9)	47	13.6 (10.2–17.7)	20	7.8 (4.8–11.8)
How often are/were you physically exhausted after work?						
Never	99	16.2 (13.3–19.3)	41	11.9 (8.7–15.8)	58	22.4 (17.5–28.0)
Some of the time	255	41.6 (37.7–45.6)	130	37.7 (32.6–43.0)	121	46.7 (41.5–53.0)
Often	135	22.0 (18.8–25.5)	86	24.9 (20.5–29.8)	47	18.2 (13.7–23.4)
Always	124	20.2 (17.1–23.6)	88	25.5 (21.0–30.5)	33	12.7 (8.9–17.4)

Note: Bold font indicates significant at $\alpha = .05$.

^aResults by gender exclude Transgender, Other, or Gender Nonconforming respondents (included in the total results), but this can be indirectly calculated. Results by gender may differ from the overall total, due to the exclusions by gender and missing responses for individual questions.

^bSeparate questions for each body area.

^cThe Patient Health Questionnaire-2 is a 2-item depression screening tool; the score is total of responses to the 2 questions “How often have you been bothered by having little interest or pleasure in doing things?” and “How often have you been bothered by feeling down, depressed, or hopeless?”

by common themes. Common barriers to claim filing are presented in Table 5, with select examples of verbatim responses. Based on the responses to the question of why they did not file claims, janitors reported working while injured and in pain, felt they were unable to seek care or take time off, and expressed the likelihood of financial hardship if they were to be receiving WC or not working. The responses shared by janitors indicated that they primarily feared retaliation or were otherwise blocked by their employer's attitudes, threats, or suppressive actions (29%), followed by lack of knowledge about the WC system (22%).

Table 6 presents estimates of relative risk and 95% CIs for multivariable analyses for WRIL risk. Increased risks were shown for women (though when adjusted for age and race, this risk became only borderline significant), janitors in the age category “40–49,” janitors of Latino/Hispanic ethnicity, and several work organization and health factors (Table 6). The largest risk difference was for janitors who reported they were

unable to take their regularly scheduled legal breaks, who had an adjusted relative risk of 2.7 compared to those who could take their breaks, while those that reported that they could take breaks only “sometimes” had an adjusted increased relative risk of 1.8 (Table 6). Lack of adequate sleep (less than 7 h) and potential depression (PHQ-2 score of 3 or higher) were both associated with significant increased WRIL risk (Table 6). Lack of adequate sleep had an adjusted relative risk of 1.5, and potential depression had an adjusted relative risk of 1.9 (Table 6).

4 | DISCUSSION

We assessed the results of a statewide survey of janitors, characterized the population and their injury burden, and explored factors that may play a role in the risk of WRIL. Janitors face high injury risk,

TABLE 5 Barriers preventing workers' compensation claim filing after work-related injury ($n = 63$), Washington state janitors, 2019–2020

Primary theme	Definition	Select verbatim response(s)	<i>n</i>	%
Employer suppression and/or retaliation	1. Fear of retaliation for filing a claim; 2. Employer not following up w/worker's injury; 3. Employer not sharing info to file WC	<i>Because my supervisor said not to ...the owner made it clear if I followed thru, [redacted] would find cause to fire me</i>	18	28.6
Lack of knowledge	Didn't know they: 1. had insurance; 2. could file; 3. Didn't know the severity of their injury; 4. Don't know the needed info to file WC	<i>I didn't know we had to. It was the first injury I had at work I don't know how to apply</i>	14	22.2
Financial hardship	1. Unable to take time off: a. no insurance, b. no sick leave; 2. Can't file because of income, unable to pay bills with WC checks	<i>I usually just work through the pain because I don't have paid injury/sick time I can't survive on workers comp! ...they wanted to do surgery for [redacted] and I didn't want to because I couldn't miss work</i>	≤10	-
Work-related musculoskeletal disorder	Complex injury that builds over time—no 1 precipitating event	<i>Repetitive injury that goes away with rest</i>	≤10	-
Minor injury	Worker considered their injury minor and no need to file WC.	<i>I didn't think it was that serious</i>	≤10	-
Ongoing issue/still in pain	Worker still experiences pain and hasn't filed a WC.	<i>I still have problems</i>	≤10	-

and these survey results confirm that risks are not evenly distributed across the population, with women facing higher risk than men, and Latinos facing higher risk than Whites or those of other races (Table 6). Occupational factors such as perceived impact of tool quality, and health factors such as sleep and depression are also associated with janitors' risk of WRIL. The percentage of reported WRIL in janitors in this survey (21%, Table 4) is higher than any other previously reported estimates for janitors in WA, such as the BRFSS.³

4.1 | Race and ethnicity

The survey sample clearly demonstrates the racial and ethnic diversity of the WA janitorial workforce. The majority of respondents were White (57%, Table 2) which is less than estimates of the overall state working population by race from the U.S. Census (average 79.7% White, 20.3% non-White in WA, 2015–2019).⁶⁹ Race and ethnicity differed by union membership, with union respondents in this survey being 70% non-White, as compared to 31% of the non-union respondents. In this survey, 13% of all janitors reported they were Latino/Hispanic (Table 2), and there was no significant difference in the percentage of Latino/Hispanic janitors between union and non-union janitors. This percentage is lower than the CPS estimate of 15% for WA “janitors and building cleaners” (occupation code 4220),⁶⁸ and lower than the QWI average (22% from 2015 to 2019) for workers employed in NAICS 5617 Services to Buildings and Dwellings.⁶⁹ Results from the WA-BRFSS found 22% of janitors were Hispanic/Latino compared to 11.0% of all other workers.³

Latino janitors are at higher risk of injury relative to other groups of janitors. While comprising only 13% of respondents (Table 2), 32% of Latino janitors reported a WRIL in the past year as compared to 17.8% of non-Latino janitors (data not shown). Janitors who were Latino had an increased relative risk of 1.7 as compared to non-Latino White janitors (Table 6). An increased risk for Latino/Hispanic janitors was also found in a study of union janitors in Minnesota, which reported an increased adjusted relative risk of 1.97 for Latino/Hispanic janitors as compared to non-Latino/Hispanic janitors.⁴ Occupational health risks have been shown to vary by race/ethnicity, with higher risks particularly for Latino/Hispanic janitors,^{70–72} and our results reflected this pattern.

4.2 | Age

There was a significantly increased relative risk of injury for janitors in the “40–49” age category, almost twice that of the youngest janitors (aged 18–29) in the sample (Table 6), which may reflect years of exposure on the job, seniority, or other factors. Work tasks may be segregated by age with older or more senior (job tenure) janitors doing different tasks. Union and non-union respondents had differences in age distribution, with 49% of non-union janitors being under 40 years of age, compared to 30.5% of union janitors ($p < .0001$, data not shown) in this study. These results differ from a study of janitors' injury risk in Minnesota, which found double the risk for janitors under 30 years of age.⁴ Comparing the two studies' results presents difficulties as the Minnesota study consisted mostly of union janitors where

TABLE 6 Factors involved in WRII—preliminary multivariable analyses of select characteristics

	WRII in the past 12 months			
	Relative risk Unadjusted		Relative risk Adjusted	
		95% CI		95% CI
Gender (1)				
Male	<i>Referent</i>	-	<i>Referent</i>	-
Female	1.4	1.01–2.01	1.4	0.96–2.01
Age (2)				
18–29	<i>Referent</i>	-	<i>Referent</i>	-
30–39	1.5	0.83–2.77	1.4	0.74–2.51
40–49	1.9	1.06–3.48	1.8	0.98–3.20
50–59	1.2	0.62–2.29	1.2	0.61–2.23
60+	2.0	0.67 –6.20	2.0	0.64–6.18
Race/ethnicity* (3)				
Black/African American	1.1	0.67–1.89	1.1	0.66–2.01
Latino/Hispanic	1.7	1.11–2.49	1.7	1.09–2.52
White	<i>Referent</i>	-	<i>Referent</i>	-
Other/More than one	1.1	0.73–1.74	1.2	0.74–2.0
Marital (4)				
Single	1.2	0.81–1.72	1.4	0.98–2.16
Married	<i>Referent</i>	-	<i>Referent</i>	-
Divorced	1.7	1.04–2.66	1.7	1.06–2.87
Education (4)				
No formal schooling/elementary	1.8	0.91–3.77	1.3	0.61–2.67
Some high School	1.3	0.56–2.79	0.8	0.33–1.89
High school graduate or GED	1.3	0.71–2.40	1.1	0.63–2.05
Some college	1.4	0.76–2.53	1.3	0.73–2.41
College graduate	<i>Referent</i>	-	<i>Referent</i>	-
Annual household income (5)				
<50K	1.3	0.74–2.27	1.1	0.65–2.01
\$50K or more	<i>Referent</i>	-	<i>Referent</i>	-
Union member (5)				
Yes	1	0.70–1.43	0.9	0.58–1.44
No	<i>Referent</i>	-	<i>Referent</i>	-
Overall tenure as a janitor (5)				
<1 year	0.7	0.32–1.44	0.7	0.30–1.68
1–4 years	0.9	0.50–1.45	0.8	0.46–1.58
5–19 years	1.1	0.63–1.79	1.0	0.53–1.72
20+ years	<i>Referent</i>	-	<i>Referent</i>	-

TABLE 6 (Continued)

	WRRI in the past 12 months			
	Relative risk Unadjusted	95% CI	Relative risk Adjusted	95% CI
Hours per week normally worked at this (janitorial) job (5)				
1-39 h/week	1.0	0.68-1.35	1.0	0.66-1.44
40 h/week	<i>Referent</i>	-	<i>Referent</i>	-
More than 40 h/week	1.3	0.76-2.28	1.3	0.74-2.40
Do/Did your shifts change at this job? (5)				
No	<i>Referent</i>	-	<i>Referent</i>	-
Yes	1.3	0.98-1.94	1.3	0.90-1.93
Have a 2nd or more job (5)				
Yes	0.7	0.49-1.2	0.7	0.44-1.0
No	<i>Referent</i>	-	<i>Referent</i>	-
Do you have access to paid vacation leave? (6)				
Yes	0.8	0.60-1.15	0.8	0.56-1.28
No	<i>Referent</i>	-	<i>Referent</i>	-
Are you discouraged from using paid sick leave? (6)				
No	<i>Referent</i>	-	<i>Referent</i>	-
Yes	1.8	1.31-2.60	1.9	1.27-2.79
Have no paid sick leave	1	0.60-1.66	1.0	0.56-1.69
Do/Did you get to take your regularly scheduled (mandated by law) breaks and lunch time? (6)				
Yes	<i>Referent</i>	-	<i>Referent</i>	-
Sometimes	1.7	1.12-2.52	1.8	1.14-2.71
No	2.2	1.48-3.22	2.7	1.77-4.08
How often are/were there not enough people or staff to get all the work done? (6)				
Never/rarely/sometimes	<i>Referent</i>	-	<i>Referent</i>	-
Often/always	1.8	1.30-2.60	1.6	1.08-2.41
All in all, I am/was satisfied with my job as a janitor (6)				
Agree/strongly agree	0.7	0.48-1.06	0.7	0.48-1.13
Neither agree nor disagree	<i>Referent</i>	-	<i>Referent</i>	-
Disagree/strongly disagree	1.5	1.01-2.37	1.5	0.91-2.35
Quality of tools negatively impact job (6)				
Yes	2.2	1.60-3.12	2.4	1.72-3.48
No	<i>Referent</i>	-	<i>Referent</i>	-
Sleep per 24 h (6)				
<7 h/24period	1.5	1.08-2.06	1.5	1.03-2.12
>=7 h	<i>Referent</i>	-	<i>Referent</i>	-
Patient Health Questionnaire-2 Score (6)				

(Continues)

TABLE 6 (Continued)

	WRIL in the past 12 months			
	Relative risk Unadjusted	95% CI	Relative risk Adjusted	95% CI
0-2	<i>Referent</i>	-	<i>Referent</i>	-
3+ Potential depression	1.9	1.33-2.62	1.9	1.28-2.78

Note: Out of complete records only ($n = 620$). Bold font indicates significant at $\alpha = .05$.

*Variable—created from multiple questions, categories combined for analysis.

**According to the Revised Code of Washington (RCW) 49.46.200 and 49.46.210, every employer must provide access to paid sick leave for their employees, beginning January 1, 2018:

- (1) Adjusted for: age, race.
- (2) Adjusted for: gender, race.
- (3) Adjusted for: gender, age.
- (4) Adjusted for: gender, race, age.
- (5) Adjusted for: gender, race, age, education.
- (6) Adjusted for: gender, race, age, education, hours.

protections may be in place for older janitors with more seniority to modify the job tasks performed, whereas those protections may not be in place in a nonunion janitor sample. The Minnesota study also included only full-time (>30 h per week) janitors and only work-related injuries (not WRIL, as asked in this survey), and these variations may explain some of the differences. It has been shown that older age and more physically demanding work are associated with an increased risk for injury claims for serious musculoskeletal injuries, and that this relationship is the strongest in middle-aged workers (reducing slightly in the oldest age groups and lowest in the youngest).⁷³ Janitors have physically demanding jobs, and the increased WRIL risk seen here by age reflects this. Age may also be related to seniority and task, as well as task duration,⁷³ which may also influence WRIL risk. Data from the Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII) shows a similar pattern in the number of nonfatal occupational injuries and illnesses involving days away from work by industry and age of worker, which peaks for Janitorial Services (NAICS 561720) in the 45-54 age group.⁷⁴ When looking at the same SOII data by occupation (Janitors and cleaners, except maids and housekeeping cleaners, SOC 37-2011), the highest percentage is in the older age group (55-64), but 2nd highest in the 45-54 age groups; and overall, the percentage of injured janitors (with days away from work) under 35 was only 20%, as compared to 34% of workers in "All Occupations."⁷⁵

4.3 | Gender

By gender, 57% of janitors surveyed were women (Table 2). This is higher than the QWI employment estimates for WA 2015-2019 for janitors of 37% female⁶⁹ and the 2019 CPS estimates of 27% female for janitors.⁶⁸ Women also made up the majority (64.5%) of injured janitors in the data (Table 4). These results are similar to an analysis of WC claims by gender for janitors in WA, which found that women made up 55% of injured janitors in WA from 2003 to

2013. Women in that study also had higher WRIL rates than men, despite making up less of the workforce, both janitorial and overall.¹ The Minnesota study also found that janitors who are women had increased risk of work-related injury.⁴ Previous work has found differences in job tasks and time by gender in janitors,⁷⁶ which may influence WRIL risk.

In this study, Janitors who are women had a lower mean age (Table 2), and different age distribution—63% of janitors under 40 years of age were women compared to 37% of men ($p < .01$, data not shown). One possible explanation for these age and gender differences may be a healthy worker survivor effect, where women are injured and leave the janitorial workforce at a higher rate, while uninjured men remain; women may also leave the workforce for other social and economic reasons.

The majority of janitors who participated in the survey were not union members, and there were significant differences in union membership by gender (Table 3), with men making up the majority of union janitors, and women being the majority of non-union janitors. The proportion of union janitors who were women among respondents (21%, Table 3) was lower than the 27% estimated by NIOSH ELF for employed janitors in WA for 2018-2019.⁷⁷ Union membership did not appear to affect the risk of WRIL (Table 6).

4.4 | WRIL and claim filing

The proportion of janitors reporting a WRIL in the past 12 months (21%, Table 4) was higher than previous estimates for WA janitors from other data sources. An analysis of WA-BRFSS data for janitors from 2011 to 2017 found 7.9% of janitors reported a WRIL in the past year, compared to 6.0% for all other workers.³ The BRFSS is a large telephone survey of the adult noninstitutionalized population,⁶⁴ and does not exclusively focus on workers and worker safety and health topics. Janitors are also a difficult population to reach by phone, thus there were just under 500 janitors identified in the WA-BRFSS over

the 7-year period analyzed in the study.³ A study of union janitors in Minnesota found that over the study period (two sequential 6-month data collection periods), 34% reported an injury, and that women had an adjusted injury rate higher than men.⁴

This study confirms significant underreporting of WRIL to WC (Table 4). This is comparable to previous work assessing underreporting by industry and occupation to the WA WC system using BRFSS data,⁷⁸ which found overall 13% of WA workers reported having a WRIL in the past year, but only 52% of those reported that they filed claims.⁷⁸

The most common theme raised by janitors who reported a WRIL but did not file a claim was employer suppression or retaliation (actual, threatened, or fear of). In previous work examining underreporting in the WA WC system⁷⁹ only 6% reported that they were worried about retaliation or felt threatened. However, that analysis did not have sufficient numbers to analyze by specific occupations, and included workers from all industries and occupations.⁷⁸ Janitors have many differences from other working populations including wage,⁷ status,⁴⁶ knowledge of WC, access to healthcare,¹⁰ and demographic/health/occupational characteristics³ and these factors likely play a role in likelihood of claim filing. Other occupations likely exhibit different patterns of underreporting, and may cite different reasons. Fan et al. reported that the largest reason cited by workers who didn't file was lack of knowledge (14%),⁷⁸ as did a study with janitors in Minnesota,⁸⁰ and this was the second most common issue cited for janitors in our analysis (Table 5). Another factor that might influence claim filing is the type of injury or illness experienced, which also varies by industry and occupation,^{2,55} by gender (specifically in janitors),¹ and by race and ethnicity; for example, an analysis of traumatic occupational injuries found higher incidence rate but lower severity of injuries for Latino workers.⁷¹ The JWS survey did not collect details on injury characteristics—another component of the JWS is conducting in-depth interviews with injured janitors who file WC claims regarding the nature and type of their injuries and the situations leading to their occurrence. Janitors may also be aware that even if they file a claim, it may be protested by their employer or rejected. A study of Las Vegas hotel cleaners found a claim acceptance rate of 57%,⁷⁰ and Hispanic cleaners in that study were 50% more likely to report that their claim had been denied. A study of Latino building cleaners found that there was widespread concern among participants about fear of job loss, unpaid or delayed wages, having multiple jobs, excessive workloads, stigma, psychosocial stress, enduring hazardous working conditions and working through WRIL—but participants felt constrained by their documentation status to say nothing.¹⁸

Additionally, some responses to the question on not filing a claim suggested that janitors are delaying care until the severity of their pain or injury reaches a certain point, as may be the case for complex musculoskeletal disorders. Better access to health care, and benefits including paid sick leave and vacation, and the ability to use those benefits, would be beneficial both to janitors' present health and in preventing the development of more severe sequelae. Further in-depth surveys targeting occupations whose workers face overlapping

vulnerabilities, such as those in low-wage jobs that do not provide benefits, would be valuable in more accurately assessing WRIL rates and barriers to reporting. Incomplete capture by surveillance systems (such as WC) may result in industries and occupations not being correctly identified as "high risk," as they would be if cases increased to reflect the true WRIL rate. This may be reflected in artificially low WC insurance premiums, cost shifting to private medical insurance or other social insurance programs, like Medicaid, as well as missed opportunities for prevention and intervention activities.

4.5 | Work organization

The results of the work organization questions show that janitorial work in WA is primarily non-union, performed by janitors paid hourly, who work under 40 h per week on average for companies contracted to clean buildings (Table 3). Union janitors primarily worked 40-hour work weeks (81%), as compared to nonunion janitors, where the majority reported working 1–39 h per week (72%).

The work organization questions reveal several differences by gender, with women having less union representation, a higher proportion reporting changing shifts on the job, more inadequate supplies, and higher percent reporting inability to take sick and vacation leave suggesting suboptimal working conditions (Table 3).

Under Washington State law, effective January 1, 2018, employers are required to provide paid sick leave to employees,⁸¹ yet 20% of janitors who are women reported that they have no sick leave (Table 3). While the relative risk of WRIL did not increase with usual hours worked, having additional job(s), or having access to paid vacation leave, being discouraged from using sick leave, an inability to take regular breaks, and insufficient staffing were significantly associated with increased risk of WRIL (Table 6). These results indicate that women are more likely to have precarious employment (PE) arrangements than men are, and Latino janitors (of both genders) more than those of their White counterparts. These working conditions may lead to increased risk of WRIL. A longitudinal study of PE in the United States found that women and people of color (POC), including Latino workers, have persistent, increased, and increasing employment precarity.⁸² Our results confirm that while the systemic shift towards PE affects all workers,⁸² it disproportionately affects women and POC, and may be associated with increased WRIL risk.

While previous work identified the gender differential in WRIL in WA janitors,¹ the mechanisms were unclear. While the unadjusted relative risk was increased for women in this study, this risk became slightly less significant when adjusted for age and race (Table 6). The analysis of the JWS statewide survey data reveals that the difference in WRIL likelihood in janitors by gender may be related to different work arrangements and patterns of employment. Job tenure, hours worked, shift changes, and having a second job were not significant in the model (Table 6). This may point to other work factors such as safety culture and climate and the impact of supervisors and supervisor-employee relationship, which may differ by gender, age,

and race. These possibilities are suggested by the significance of the (in)ability to freely take work breaks, sick or vacation leave, adequacy of staffing, and the quality and maintenance of tools on injury risk (Table 6). These may all be influenced by the particular safety climate and culture of the employer and the quality and integrity of the supervisor and their relationship with janitors. These issues may also reflect on the quality of supervisor-staff relationships, and the overall safety culture of the organization. A study of forestry workers in Oregon found that workplace organization factors and safety climate affected the WRIL and claim experience of Latino workers,⁸³ and a study of Latino building cleaners found that there was widespread stress related to management practices.¹⁸ These factors should be explored by race in future analyses of the JWS survey. Women and Latinos may be more likely to work in less stable employment, and may be subjected to workplace discrimination (from supervisors, coworkers, and/or the public). Future analyses of the JWS Statewide Survey will explore these findings in greater detail, including chemical exposures, job/control demand, ergonomic issues, stress, discrimination, and the role of supervisors. Additional analyses are also warranted to explore the impacts of structural racism on the working conditions of non-White janitors, particularly Latino janitors, which may explain the differences in WRIL risk.

4.6 | General health

When asked to rate their general health, 19.4% of janitors rated their health as fair or poor (Table 4). By union membership, 18% of union janitors, and 23% of non-union janitors (data not shown), rated their health as fair or poor. The percentage of janitors self-rating their health as fair or poor is higher than previous estimates for WA janitors (WA-BRFSS data) where the comparable share was 15.3%.³ This, in turn, is significantly higher than the 9.7% reported for all other workers in that study.³ A focus group study of Latino cleaning workers found that many participants reported good health but in follow-up questions about their job, most also indicated having work-related health problems.¹⁸

The WA-BRFSS study also asked questions on amount of sleep per night, with <7 h considered inadequate;⁸⁴ the authors of that study found that 43.5% of janitors reported inadequate sleep, significantly higher than 33.4% of all other workers and 29.5% of nonworking adults.³ A higher proportion, 55%, of survey respondents in the current JWS study reported inadequate sleep (Table 4), than in the WA-BRFSS results, and inadequate sleep was associated with an increase in the adjusted relative risk of WRIL (Table 4) in our results. This is in line with findings that inadequate sleep (<6, and 6–8 h) were found to be increased with adjusted relative risks from 1.6 to 2.2 in union janitors in Minnesota.⁴⁴ There were no significant differences in inadequate sleep between union and nonunion janitors in our study (Table 4). Commercial janitors tend to work evening and overnight shifts, with 48.8% of the janitors in our sample reporting a regular shift starting time of 5–9 PM (data not shown). Shift scheduling issues may affect janitors' ability to get adequate sleep and feel

adequately rested. A significantly higher percentage of union janitors reported a regular shift starting time of 5–9 pm (52%) than nonunion janitors (39%) ($p < .005$, data not shown). Shift and overnight work has been shown to impact health,^{85,86} and there are differences by race and gender in the distribution of these arrangements that may increase health and economic risks for women and non-White workers,⁸⁷ including in janitorial work, which frequently has non-standard working arrangements.⁸⁷

Potential depression was also found to nearly double the adjusted relative risk of WRIL (1.9, Table 6), and 19.1% of the janitors in the survey met the scoring criteria of 3 or more on the PHQ-2 (Table 4) (there was no significant difference between union and non-union janitors in this regard). While not directly comparable to the questions on depressive disorder asked on the WA-BRFSS, the estimate for janitors in one analysis was 23.1%, higher than all other workers (17.9%) but lower than nonworking adults (25%).³ Another study using the WA-BRFSS data by occupation found that workers in Cleaning & Building Services (which would include janitors) had an adjusted OR of 1.95 (compared to management occupations) significantly associated with Frequent Mental Distress.⁸⁸ Depression has also been identified as a chronic comorbidity that can negatively affect return-to-work post-WRIL, and reduce earnings post-injury.⁸⁹ Outreach and education to promote mental health, coupled with widely available low- or no-cost screening and treatment of depression and other forms of mental distress would be valuable for janitors. An analysis of the implementation of minimum wage law in the United Kingdom suggests that increasing wages may reduce depressive symptoms in low-wage workers.⁹⁰

4.7 | Implications

These results suggest several actions that may reduce the burden of work-related injuries and illnesses, pain, and stress in janitors. Primarily, to prevent injuries, efforts should be made to ensure that janitors have safe and equitable working conditions—including managing workload and staffing issues, and increasing access to benefits. Supervisors and employees may both need culturally and linguistically appropriate training on safety hazards, workers' rights, wage and hour laws, and the availability of WC. Disparities in occupational health by gender and race with regard to job insecurity and work organization have long been recognized and there are many suggested strategies to reduce these inequities.⁴⁶ PE disparately affects women and marginalized populations, and may have long-term implications for worker health.⁸²

For janitors that do get injured or made ill at work, improving protections against employer retaliation for using the WC system and providing adequate WC benefits for janitors and other low-wage workers so that they can afford to live while recovering from their WRIL may be WC system improvements suggested from this study. Further, the general lack of awareness among injured janitors, and likely uninjured janitors, of the WC insurance system undermines its effectiveness as a social safety net. Workers face many long-term

economic and social consequences following work-related injuries, including loss of earnings and savings, problems paying bills, debts, and selling belongings; as well as residual pain and other physical and psychological tolls.^{91,92}

Additionally, because claim suppression was reported in this survey (Table 5), policy around the enforcement of labor laws, penalties for violations, and improved mechanisms for janitors and other workers to report WRIL and safety hazards without fear of retaliation should be explored. All workers, including janitors, should have access to paid sick leave and the ability to use it when needed.

Finally, there is an ongoing COVID-19 pandemic with an increased focus on deep cleaning, and workload pressure, pace, and injuries may increase (as well as viral exposures and infections). The survey data collection period ended before WA began COVID-19 restrictions and protocols. Future work should compare rates of WRIL before-during-after the pandemic to assess the impact of the pandemic on these vulnerable essential workers. Improving access to care for low-wage essential workers such as janitors (who may be at most risk for exposure, least able to access care, use benefits, navigate WC, and may continue to work while injured or ill) should be a high priority for public health.

4.8 | Limitations

The survey data has limitations, primarily; it is a self-report cross-sectional survey with a low response rate, which limits our understanding of the results and the proposed solutions. The survey sample may not have been representative of all janitors in WA, which may affect the utility and generalizability of the results. Research from the AAPOR shows that response rates are falling across all telephone surveys,⁹³ and janitors are a particularly hard-to-reach population which likely decreased the response rate. There may also be gender and race differences in research participation and WRIL reporting. Additionally, some of the differences by race/ethnicity between union and nonunion janitors in this survey may be related to sample selection by the research firm that administered the survey, in selecting for respondents where preferred language was known (included in some of the union membership rolls).

A small percentage of the raw potential sample (~5%) were janitors identified through the WA WC system, meaning janitors who had filed previous WRIL claims. This may increase the proportion of janitors reporting WRIL in the past year in this survey upwards, as workers with a prior WRIL may be more likely to be injured at work again in the future.⁹⁴ The authors were blinded to respondents' identification method, and were not involved in selecting the final sample for contact, so we are unable to determine exactly how much this influenced the results.

Survey results and interpretation may suffer from nonresponse bias and social desirability bias. Many janitors also expressed fear of retaliation, so janitors who felt this most acutely may have chosen not to trust or engage with a state agency (e.g., not responding to mailings) at all, and thus the survey may only capture those who felt

they could safely participate, which is a limitation. The survey was also extensive and time-consuming, and results may be limited by recall bias.

Finally, while it is valuable to offer the survey in multiple languages to capture the experiences of as many janitors as possible, language choices posed several limitations. Questions validated in English may be of limited utility in translation, and there may be differences in comprehension across modes. The cultural competency of the questions is therefore unknown, especially when dealing with sensitive topics (e.g., sexual harassment, discrimination). We attempted to mitigate this by meeting with senior non-English language interviewers and discussing the aim of specific question(s), and answering any questions they had regarding interpretation of the survey; however, we cannot guarantee that all languages were translated and interpreted as intended. Multiple languages were only available by phone, which may influence participation and cooperation rates, and results may be impacted variably by mode of administration.

4.9 | Strengths

Janitors are often overlooked in public health research and while their work is valuable, they are often invisible and undervalued as workers. This is the first large-scale survey of janitors about their health and safety at work in WA, one of few existing in-depth surveys of janitors,⁴⁴ and the first that included a majority of non-union janitors. The survey was designed to capture the widest range of janitors' experiences possible, and given the prohibitive cost and logistical challenges of survey research, the number of complete surveys and respondent feedback was positive. The survey was conducted in multiple languages and through multiple modes to reach the widest range of janitors, including those who may have limited ability to voice their concerns. As such, the survey provided an opportunity for janitors to share their lived experiences. The results indicate that janitors' WRIL are likely undercounted in the WC system, and that the already-high rates of WRIL for janitors from WC data (and associated industrial insurance premiums for janitorial service firms) are being held artificially low by cost shifting to other health insurance systems, suppression, and other factors such as adequacy of benefits, financial strain, and a complex WC system. Additionally, the JWS survey data illuminate occupational health inequalities—Latino janitors face nearly double the risk of WRIL (Table 6), and half of injured respondents did not file a WC claim for their injuries (Table 5) out of fear of retaliation, lack of knowledge, and the financial inability to stop working to recover. These analyses demonstrate inadequacies of the WC system and the social safety net, and provide many possible opportunities for regulatory, enforcement, and legislative efforts to protect the health and safety of historically marginalized workers. The survey results provide a rich data set with which to further investigate working conditions and hazards, including psychosocial factors, discrimination, and information on safety culture/climate and supervisor-employee relationship

effects, which are not readily available for this population through other existing data sources.

5 | CONCLUSIONS

The results of this survey demonstrate that the relative risk of WRIL is increased for women, janitors in their 40s, and all Latino/Hispanic janitors. Workplace factors such as staffing, ability to take breaks, and perceived tool quality are associated with WRIL risk; and insufficient sleep and potential depression are also associated factors. The survey also confirms underreporting of work-related injury and illness to WC and consequently underestimates of reported rates of WRIL for janitors. Employers have a responsibility to provide a safe workplace for all their workers, but may have financial incentives to externalize costs by relying on a marginalized workforce employed under precarious work arrangements. State and national efforts should be made to improve working conditions, WRIL reporting, and increase access to and knowledge of workers' rights, healthcare, and the WC system, to improve the health and safety of janitors. The role of structural racism, sexism, and other social determinants of health in shaping the experiences of janitors, and other workers facing overlapping vulnerabilities, should be explored further, as women and Latino janitors continue to bear the burden of increased WRIL risk and less favorable work conditions.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Paul A. Landsbergis declares that he has no conflict of interest in the review and publication decision regarding this article.

AUTHOR CONTRIBUTIONS

Naomi J. Anderson conceived the work, and carried out the principal analyses, drafting results, and interpretation of results. Caroline K. Smith contributed to the design, analysis, and interpretation of the work, as well as revising content. Michael P. Foley contributed to the drafting of the economic environment section of the introduction, as well as overall manuscript interpretation and revisions. All authors gave their final approval of this version to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The full JWS project team is named in the acknowledgments section.

DATA AVAILABILITY STATEMENT

Data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS APPROVAL AND INFORMED CONSENT

All participants received written informed consent information (available in all languages) ahead of contact (regardless of the mode they used to take the survey thereafter). Participants provided written consent if they participated by mail; if by web, the consent information was presented and participants must click 'next' to proceed; and verbal consent was obtained for those participating by phone. The Washington State Institutional Review Board approved all research activities (questionnaires, incentives, consent documents, scripts, and advertising).

ORCID

Naomi J. Anderson  <http://orcid.org/0000-0002-5392-7235>

Michael P. Foley  <https://orcid.org/0000-0002-8706-8096>

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