

Original Article

# Examining Risk of Workplace Violence in Canada: A Sex/Gender-Based Analysis

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Submitted 7 February 2018; revised 14 May 2018; editorial decision 13 June, 2018; revised version accepted 28 June 2018.

## Abstract

**Objectives:** Workplace violence (WPV) is a serious issue, resulting in significant negative health outcomes. Understanding sex/gender differences in risk of WPV has important implications for primary prevention activities.

**Methods:** Utilizing two waves of the Canadian General Social Survey on Victimization ( $N = 27,643$ ), we examined the likelihood of WPV, and sub-categories of WPV, for women relative to men. Using a sex/gender analytical approach, a series of logistic regression models examined how the associations between being a woman and each of the outcomes changed upon adjustment for work and socio-demographic characteristics.

**Results:** After adjustment for work hours, women were at more than twice the risk of WPV compared to men (odds ratio = 2.12, 95% confidence interval 1.52–2.95). Adjustment for work characteristics attenuated, but did not eliminate this risk. Differences in associations were observed across sub-categories of violence, with adjustment for work characteristics attenuating sex/gender differences in physical WPV, but having minimal impact on sex/gender differences in sexual WPV.

**Conclusions:** Work characteristics explain a substantial proportion of the sex/gender differences in risk of physical WPV. However, even after adjustment for work characteristics, women still showed an elevated risk relative to men for almost all types of violence (as defined by nature of the violence, sex of the perpetrator, and relationship to the perpetrator) examined in this study. Future investigations should examine why these differences between women and men remain, even within similar occupational contexts.

**Keywords:** Canada; epidemiology; gender; health; physical assault; population-based study; sex; sexual assault; work characteristics; workplace violence

## Introduction

Workplace violence (WPV) is increasingly being recognized as a serious issue in Canada, resulting in significant negative health outcomes (de Léséleuc, 2004; Perreault, 2015). Data from the 2004 and 2014 General Social Surveys indicate high levels of self-reported violent victimization at work with 17% of all violent victimization incidents in 2004 and 27% of all incidents in 2014 occurring in the workplace (representing over 356,000 and 594,000 incidents, respectively) (de Léséleuc, 2004; Perreault, 2015). WPV has been associated with numerous negative physical and psychological health outcomes including physical injury (e.g. bruising, broken bones), posttraumatic stress disorder, depression, anxiety, sleep disruption, substance use, and in extreme cases, death (LeBlanc and Kelloway, 2002; Mayhew and Chappell, 2007; Lanctot and Guay, 2014).

Prior research has demonstrated a clear relationship between sex/gender and the risk of *general* violent victimization (i.e. fatal and non-fatal incidents occurring both inside and outside the workplace), with men being at higher risk than women for reported non-sexual violence, but at lower risk for sexual violence and other forms of gender-based violence such as intimate partner violence (Kruttschnitt, 1996; Lauristen and Heimer, 2008). However, the relationship between sex/gender and risk of WPV is more ambiguous, with previous studies not indicating a consistent direction of increased risk among men relative to women, or women relative to men for non-fatal violent workplace incidents (Moracco et al., 2000; Loomis et al., 2001; Hewitt et al., 2002). Some studies using population-level data have reported that men are at a lower risk of WPV compared to women (Islam et al., 2003; McCall and Horwitz, 2004; Horwitz et al., 2006); others have found men to be at a higher risk (Warchol, 1998; Duhart, 2001; Harrell, 2011) and still others have reported no difference in risk for men and women (Peek-Asa et al., 1997; de Léséleuc, 2004; Schat et al., 2006; Hartley et al., 2012). As few studies have accounted for variation in work time exposure between women and men, the risks for WPV between male and female labor force participants may be underestimated.

Sex/gender differences in industry participation and workplace characteristics are possible explanatory factors for the inconsistent findings of past studies (Messing, 1998; Armstrong and Messing, 2014). The Canadian labor market—like many other labor markets in the world—is highly segregated by sex/gender, with men and women being employed in different industries and occupations (Messing, 1998; Armstrong

and Messing, 2014). Even within the same occupations, men and women often perform different tasks (Messing, 1998; Armstrong and Messing, 2014). Understanding the extent to which differences in these characteristics explain sex/gender differences in risk of workplace victimization has important implications for WPV policies and targeted interventions. If differences in workplace characteristics explain sex/gender differences in risk of workplace victimization, then this suggests industry-specific or occupation-specific interventions should be developed. However, if differences in workplace characteristics do not explain sex/gender differences in workplace victimization, then this suggests that gender-specific interventions are also required.

Using data from the 2009 and 2014 General Social Survey (GSS), this study examines sex/gender differences in risk of WPV in Canada. Specifically, the objectives of this study were to: (i) estimate the differences in risk of WPV for men and women; (ii) understand if these differences vary by the nature of the violence (sexual versus non-sexual assaults), the relationship between the victim and person committing the violence, and/or the sex of the person committing the violence; and (iii) explore the extent to which sex/gender differences in risk of violence are explained by differences in work characteristics.

## Methods

This study uses cross-sectional data from two waves of the General Social Survey focused on Victimization, Cycle 23 (2009) and Cycle 28 (2014) (University of Iowa Injury Prevention Research Center, 2001; Statistics Canada, 2011). The GSS uses a stratified probability sample to target individuals aged 15 years and over, living in private dwellings in one of the ten Canadian provinces. In both Cycle 23 (2009) and Cycle 28 (2014), respondents in the in ten provinces were interviewed by telephone, while in the three territories respondents were either interviewed by telephone or in person (University of Iowa Injury Prevention Research Center, 2001; Statistics Canada, 2011). It should be noted however, that in Cycle 28 (2014) there was also a pilot survey conducted in which some respondents were contacted first by telephone and then directed to answer the questionnaire electronically (University of Iowa Injury Prevention Research Center, 2001; Statistics Canada, 2011). The response rate to the survey was 61.6% in 2009 ( $n = 19,422$ ) and 52.9% in 2014 ( $n = 33,127$ ), producing a combined sample of 52,549 respondents. To ensure each respondent was at risk for WPV and questioned about his/her occupation, we restricted our sample to those respondents who were

employed the week before the survey ( $N = 11,519$  in 2009;  $N = 18,860$  in 2014). Approval for the secondary data analyses was granted from the University of Toronto, Health Sciences I Ethics Committee.

### Outcome variables—workplace violence

The GSS asks respondents about their experiences of violent victimization in the 12 months preceding the survey. Each respondent may report more than one violent victimization incident. For each incident, respondents are asked about the nature of the violence (sexual assault, physical assault, robbery), the characteristics of the perpetrator (e.g. sex and nature of relationship to victim), and whether the incident took place at his/her workplace. For the purpose of this analysis, we focused on incidents that took place at a respondent's workplace. There were too few instances of violent robbery in the workplace to allow for an analysis of this type of violence.

We further broke down all WPV incidents by the nature of the assault (*Sexual* and *Physical*); the relationship between the person committing the violence and the victim of the violence (*Colleague*, *Stranger*, or *Other*); and the sex of the person committing the violence (*Male Perpetrator* and *Female Perpetrator*). We had originally intended to examine the four types of WPV recognized in the literature, which are defined by the victim-perpetrator relationship and include: Type I (stranger), Type II (customer/client), Type III (colleague), and Type IV (personal relationship/domestic violence) ([University of Iowa Injury Prevention Research Center, 2001](#)). Unfortunately, the GSS data was not detailed enough to permit us to tease apart Type II from Type IV, so we collapsed these two groups, identified as *Other*. The *Colleague* category includes co-workers, supervisors, managers, and bosses. The *Other* category includes a wide range of perpetrators who were not identified as a stranger or a colleague by the victim and with whom the victim had a personal relationship (e.g. family member, a current or ex intimate partner, a friend, a neighbor, a teacher, a classmate, an acquaintance, known by sight only). It is important to note a single incident may involve more than one perpetrator.

### Potential explanatory variables—workplace characteristics

The following workplace characteristics were included in our analyses: work exposure time, as indicated by the usual number of hours worked multiplied by number of weeks worked; the industry the respondent was working in (1-Education; 2-Health; 3-Accommodation/Food Services; and 4-Other); the respondent's occupation (1-Nurses and healthcare support/technical; 2-Teachers

and professors; 3-Protective services; 4-Managers; 5-Professionals, excluding nurses, teachers, professors; 6-Clerical; 7-Sales and services; and 8-Other); and the respondent's work schedule (1-Regular days; 2-Regular evening; 3-Regular nights; 4-Rotating shifts; 5-Split shift/Compressed/On-call/casual; and 6-Irregular). The broad categories used for industry and occupation were created based on adequate sample size and changes in coding between the two surveys.

### Control variables—socio-demographic characteristics

To account for socio-demographic differences between men and women in the sample, we also controlled for respondent's age, marital status, province of residence, rural versus urban residential location, and education level.

### Statistical analyses

A preliminary descriptive analysis explored the relationships between sex and each of the work and socio-demographic characteristics noted above, as well as the 12-month incidence of any, and each type of, WPV. To estimate the association between sex and WPV, and explore whether it varied by the characteristics of the violence, we used logistic regression to generate unadjusted odds ratios to represent the associations between being a woman and the risk of overall and sub-categories of WPV. We then employed a series of logistic regression models to achieve our final objective, examining how the associations between being a woman and each of the outcomes changed upon adjustment for (i) all work characteristics together, (ii) all socio-demographic characteristics together, and (iii) both work and socio-demographic characteristics together. All analyses were weighted to account for the original probability of selection into the sample, and for non-response ([Statistics Canada, 2011](#); [Statistics Canada, 2015](#)). Standard errors around each point estimate in the logistic regression models were adjusted using a series of 500 bootstrap weights provided by Statistics Canada to account for the survey design. For some of the sub-group analyses; examining the relationship between the person committing the violence and the person impacting the violence, and for violence committed by a female perpetrator; there were a number of the bootstrap replicate analyses that failed to complete. This was most likely due to missing data on the outcome in the sub-population selected for that particular replicate, given these events were relatively rare in our data. As such, we recommend some caution when interpreting the results of these sub-analyses, given the confidence bounds around the estimates may be slightly underestimated relative to the other estimates in the tables.

## Results

The initial sample of respondents totaled 30,379. After excluding those respondents missing information on either the outcome or one or more of the covariates ( $n = 2736$ ; 9% of the eligible respondents), 27,643 respondents were available for the analyses presented in this paper (10,894 from the 2009 cycle; 16,749 from the 2014 survey; 46.7% women). A logistic regression analysis including age, sex/gender, year of survey, if they experienced WPV, province of residence and geographic location (urban versus rural) examined likelihood of having missing data. Men, older respondents, and those living in British Columbia (compared to those in Newfoundland) were more likely to be missing information on covariates. No relationship was observed between experiencing WPV or geographical location and missing responses for covariates.

Table 1 presents descriptive information for our sample and separately for men and women across workplace characteristics. There were slightly more men represented in our sample than women (53% versus 47%),

and the work characteristics of men and women differed. Women were more likely to be employed in education, health and accommodation/food service industries than men, more likely to work in nursing and health care support/technical, teaching, clerical and sale/service occupations than men, and less likely to work in protective service and managerial occupations. Women were also more likely to have regular evening and rotating shifts than men, and less likely to have regular night shifts. Descriptive information on demographic characteristics of the sample are available in [Supplementary Table S1](#) of the [Supplementary Material](#) (available at *Annals of Work Exposures and Health* online).

Table 2 presents 12-month incidence of any and each specific type of WPV per 1000 persons. There were 10.8 incidents of WPV per 1000 persons in our sample, with physical assaults (7.2 per 1000 persons) more common than sexual assaults (4.0 per 1000 persons). WPV was most often perpetrated by a stranger (5.0 per 1000 persons), followed by an 'other' (non-colleague/non-stranger) relationship (3.6 per 1000 persons), and least often by

**Table 1.** Descriptive information on workplace characteristics of the sample, and separately for men and women ( $N = 27,643$ ).

Variable	All	Men	Women	P-value for sex diff
Sex				
Men	53.29	---	---	
Women	46.71	---	---	
Industry				
Education	8.06	5.20	11.32	<0.0001
Health	12.04	3.93	21.29	
Accommodation/Food Services	5.94	4.89	7.14	
Other	73.96	85.98	60.26	
Occupation				
Nurses and healthcare support/technical	5.51	1.43	10.17	<0.0001
Teachers and professors	4.96	3.37	6.77	
Protective services	1.43	2.33	0.41	
Managers	8.57	10.11	6.82	
Professionals (excl nurses, teachers, profs)	15.16	16.06	14.13	
Clerical	12.38	6.41	19.18	
Sales and services	22.93	18.73	27.73	
Other	29.06	41.56	14.79	
Work Schedule				
Regular days	68.21	68.54	67.83	<0.0001
Regular evening	5.75	5.39	6.16	
Regular nights	2.21	2.66	1.71	
Rotating shifts	9.42	8.73	10.20	
Split, Compressed, Casual, Other	4.15	4.20	4.10	
Irregular	10.25	10.47	10.00	

Note: estimates weighted for initial probability of selection and for non-response.

**Table 2.** Rates of workplace violence per 1000 persons, overall and for different types of violence. Stratified estimates presented for men and women ( $N = 27,643$ ).

	All (95% CI)	Males (95% CI)	Females (95% CI)	P-value for sex diff
All Workplace Violence	10.80 (9.06–12.62)	8.10 (6.02–10.09)	14.00 (11.03–17.01)	0.001
<b>Nature of Violence</b>				
Sexual Assault	4.00 (2.80–5.15)	1.60 (0.70–2.43)	6.70 (4.44–9.01)	<0.0001
Physical Attack	7.20 (5.90–8.57)	6.80 (4.94–8.71)	7.70 (5.85–9.55)	0.52
<b>Relationship between person committing the violence and the person impacted by the violence</b>				
No Relationship	5.00 (3.61–6.36)	4.80 (3.07–6.47)	5.20 (3.06–7.41)	0.73
Colleague Relationship	2.10 (1.32–2.81)	1.70 (0.78–2.70)	2.40 (1.29–3.58)	0.35
Other Relationship	3.60 (2.85–4.44)	1.60 (0.94–2.26)	6.00 (4.39–7.56)	<0.0001
<b>Sex of person committing the violence</b>				
Male Perpetrator	9.00 (7.33–10.65)	6.60 (4.66–8.45)	11.80 (8.95–14.59)	0.002
Female Perpetrator	1.90 (1.25–2.49)	1.40 (0.68–2.21)	2.40 (1.35–3.35)	0.15

a colleague (2.1 per 1000 persons). WPV was more frequently perpetrated by a man (9.0 per 1000 persons) than a woman (1.9 per 1000 persons). Differences were noted in the rates of WPV for men and women for all WPV, sexual assaults, where the person committing the violence was a client or had a personal relationship with the object of the violence, and when the person committing the violence was male. In each of these situations, the rates of violence among women were higher than they were among men.

Table 3 presents odds ratios for WPV (overall and for different types of violence) for women relative to men from a series of nested logistic regression models. In our unadjusted model (Model 0) women were at a statistically significantly increased risk of overall violence [odds ratio (OR) = 1.75, 1.25–2.45], sexual violence (OR = 4.32, 2.21 – 8.43), violence involving a client or an individual with whom the victim had a personal relationship (OR = 3.75, 2.22–6.34), and violence in which the person committing the violence was male (1.81, 1.23–2.64). Model 1 adjusts for differences in the number of hours worked in the previous 12 months for men and women (time at risk). Adjustment for hours worked accentuated differences between men and women, increasing the odds for all types of violence for women relative to men.

Model 2 and Model 3 include additional adjustment to Model 1 for workplace characteristics (Model 2) and demographic characteristics (Model 3). In general, adjustment for work characteristics attenuated the statistically significant odds ratios towards the null, but in each case women were still at a statistically significant increased risk of violence relative to men, even after adjustment for workplace characteristics. Adjustment for demographic characteristics resulted in only modest changes in odds ratio estimates compared to Model 1, with the most noticeable changes observed for sexual violence.

A final set of models (Model 4) included both workplace and demographic characteristics. Compared to Model 2 (which adjusted for workplace characteristics) additional adjustment for demographic characteristics resulted in only minor attenuation of the odds ratio estimates, although the elevated risk for women in situations where the person committing the violence was a client or had a personal relationship with the victim, reached only marginal statistical significance (OR = 1.73, 0.99–3.02).

Given the adjustment for workplace characteristics was associated with the largest change in odds ratio estimates, we ran a series of additional models where each workplace characteristic (industry, occupation and work schedule) were included separately. These models are presented in the [Supplementary Appendix \(Table S2\)](#) (available at *Annals of Work Exposures and Health* online). Adjustment for industry explained the largest portion of the elevated risk of women, reducing the ORs (relative to the model that adjusts for work time exposure only) by between 16 and 68% across seven of the outcomes.

## Discussion

WPV is an important public and occupational health issue. Understanding if there are sex/gender differences in the risk of WPV and the impact that workplace characteristics have on these differences, is important to guide the development of primary prevention activities in this area. In this study, using population-level data from Canada from the 2009 and 2014 GSSs, we have attempted to address these knowledge gaps. Overall, our results suggest that there are significant sex/gender differences in risk of WPV across several, though not all, WPV outcomes. Our initial descriptive analyses show a

**Table 3.** Odds of experiencing workplace violence for women relative to men for overall violence and for subgroups of violence, with adjustment for work hours, workplace factors and demographic factors ( $N = 27,643$ ).

	Sex	Model 0	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>c</sup>	Model 4 <sup>d</sup>
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any	Female	1.75 (1.25–2.45)	2.12 (1.52–2.95)	1.65 (1.12–2.43)	2.06 (1.47–2.88)	1.57 (1.08–2.30)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
<i>By Type of Violence</i>						
Sexual Violence	Female	4.32 (2.21–8.43)	5.23 (2.68–10.20)	4.38 (2.01–9.54)	4.98 (2.54–9.77)	3.94 (1.82–8.55)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
Physical Violence	Female	1.13 (0.78–1.63)	1.37 (0.95–1.98)	0.94 (0.63–1.41)	1.34 (0.92–1.95)	0.93 (0.62–1.40)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
<i>By Perpetrator-Victim Relationship</i>						
No relationship	Female	1.1 (0.63–1.92)	1.34 (0.77–2.34)	1.55 (0.86–2.80)	1.30 (0.74–2.27)	1.39 (0.81–2.39)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
Colleague	Female	1.40 (0.65–3.02)	1.71 (0.79–3.67)	1.27 (0.64–2.52)	1.78 (0.83–3.81)	1.22 (0.65–2.29)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
Other	Female	3.75 (2.22–6.34)	4.55 (2.70–7.69)	1.81 (1.04–3.16)	4.26 (2.49–7.26)	1.73 (0.99–3.02)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
<i>By Perpetrator Sex</i>						
Male	Female	1.81 (1.23–2.64)	2.19 (1.50–3.19)	1.79 (1.17–2.75)	2.14 (1.46–3.13)	1.71 (1.13–2.58)
	Male	<i>Ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>
Female	Female	1.63 (0.80–3.32)	1.98 (0.97–4.04)	1.05 (0.44–2.50)	1.88 (0.93–3.80)	0.96 (0.41–2.27)
	Male	<i>ref</i>	<i>ref</i>	<i>Ref</i>	<i>ref</i>	<i>ref</i>

<sup>a</sup>Model adjusted for hours of work in the previous 12 months.

<sup>b</sup>Model adjusted for work hours, industry, occupation and work schedule.

<sup>c</sup>Model adjusted for age, province, urban/rural living location, education, and marital status.

<sup>d</sup>Model adjusted for work hours, industry, occupation, work schedule, age, province, urban/rural living location, education, and marital status.

relationship between being a woman and risk for WPV. This relationship remains in the adjusted models for risk of experiencing any type of violence, sexual violence, violence perpetrated by someone other than a colleague/stranger and violence perpetrated by a male. The risk of all types of WPV increased for women upon adjustment for work hours. This change highlights the importance of taking hours of exposure into account when trying to understand risk for WPV (or other health outcomes) between male and female labor force participants.

Our results confirm past literature showing that women are at a significantly higher risk for sexual assault than men (Cook et al., 1995; Miedema et al., 2010) and that men are significantly more likely to be the perpetrators of WPV than women (Chappell and Di Martino, 2006). In agreement with some previous studies, we found that the risk of experiencing a physical assault in the workplace is no different for men and women (Cook et al., 1995; Shields and Wilkins, 2009; Andrews et al., 2012). These findings contradict those of other studies, however, which have suggested that male workers are at a higher risk of experiencing physical violence compared to female workers (Stock and Tissot, 2012; Guay

et al., 2015) and those that suggest female workers are at higher risk compared to male workers (Bigam et al., 2014). The inconsistency of these previous findings on the direction of risk of non-sexual WPV between men and women may reflect the failure of many previous studies to account for sex/gender differences in work time exposure. Another possibility is that the majority of these studies have been occupation- or industry-specific. It is possible that the risk of WPV for women relative to men may differ across occupation or industry groups and further work should explore if there are particular aspects of certain occupational/work environments that place men or women at increased risk of violence (Fisher and Gunnison, 2001).

Gendered labor-market participation across industries appears to be an important determinant of sex/gender differences in rates of non-sexual WPV. Women in our sample were more likely than men to work in industries with higher rates of WPV (e.g. health care, education) (Fisher and Gunnison, 2001; Cooper and Swanson, 2002; Mayhew and Chappell, 2007). These industries may have characteristics that place workers at higher risk for WPV, such as working in close proximity

to clients and their families or exposure to clients with mental health and/or addiction issues (Guay et al., 2015). However, even among these industries, a gendered division of labor exists whereby women and men working in the same occupation conduct different tasks, which can affect risk for experiencing an incident of WPV (Baines and Cunningham, 2011). Previous research has also pointed to elevated risk of experiencing workplace violence among women working casually, suggesting that there may also be an interaction among industry, sex/gender, and employment arrangements which may place women at higher risk (LaMontagne et al., 2012). A further exploration of the relationship between sex/gender, industry, and particular employment arrangements (e.g. casual work) on risk of workplace violence is warranted.

This study highlights the importance of considering sex/gender differences in policies and interventions aimed at addressing WPV. Overall, our results suggest that work characteristics explain a substantial proportion of the risk differential for women relative to men. This suggests that policies aimed at preventing or reducing WPV for women and men should be industry or occupation specific. However, even after adjustment for work characteristics, women still showed an elevated risk of experiencing violence relative to men for almost all types of violence. This is particularly striking when considering adjustment for work exposure. Future investigations should examine why these differences between women and men remain, even within similar occupational contexts.

The results of this study should be interpreted given the following limitations. First, this study only examined physical and sexual assaults in the workplace, which is not reflective of the wide range of incidents that fall under the umbrella of WPV. This definition is more restrictive than those included under provincial occupational health and safety legislation in Canada, which include verbal harassment and threatening behavior, as well as attempted acts of violent victimization. Previous studies have found that women may be more likely to experience harassment and stalking in the workplace relative to men suggesting that their risk of WPV may be underestimated here (Cook et al., 1995, Schell, 2003, Sojo et al., 2016). Future studies utilizing the GSS victimization cycle data could include an examination of stalking as it was included in Cycle 28 (2014). Second, due to the lack of WPV data sets in Canada, this study relied on a secondary data analysis of the GSS victimization cycle which has limitations for the study of WPV risk. For example, we were unable to tease apart risk of experiencing Type II violence (e.g. client) from that of other perpetrators with whom the victim has a personal relationship (e.g. spouse, neighbor), and other possible determinants of sex/

gender differences in rates of WPV such as psychosocial job stressors and income level were not available in the GSS victimization cycle data. A population-based survey specific to WPV or a larger sample size in the GSS victimization cycle is needed to fill this gap. Third, given that the GSS victimization cycle data were primarily collected via telephone and in-person interviews, social desirability bias is a concern (Kreuter et al., 2008). This is particularly so given the sensitive nature of some of the questions. Sexual violence in particular is known to be vastly under-disclosed due to stigmatization and other social factors, and this may be especially so for men for whom stigmatization may be more pronounced (Donne et al., 2018). It is possible, however, that the use of a pilot electronic questionnaire for some respondents in Cycle 28 (2014) may have partially mitigated social desirability bias as web-based surveys have been found to increase reporting of sensitive data when compared with surveys administered by telephone (Kreuter et al., 2008). Fourth, this study relied on cross-sectional data and therefore we are unable to attribute causality. While we have highlighted gendered labor-market participation as a determinant of sex/gender differences in rates of non-sexual WPV, there are other possible determinants of violence that were not able to be explored here (e.g. psychosocial job stressors, income level). Finally, the current analysis was not able to adequately explore the interaction between sex/gender, work characteristics, and employment arrangement (e.g. casual employment). We were however able to adjust for hours of potential exposure to workplace violence, which adds to previous work in this area.

Despite these limitations, this study also has significant strengths. Our use of self-reported WPV data is a strength relative to other studies that have relied on internal WPV reports or workers' compensation claims, which are known to only capture a fraction of the WPV incidents (Arnetz et al., 2011; Pompeii et al., 2013). Finally, unlike many studies conducted on WPV, this study was based on a representative sample and is one of the first in the Canadian context to provide data on sex/gender risk differences in who perpetrates acts of WPV which could have important implications for policy and prevention activities.

## Conclusion

This study has contributed important population-level data on sex/gender differences in risk of WPV. It has also highlighted that significant knowledge gaps remain in understandings of WPV generally and sex/gender differences specifically. The results of our study demonstrate that WPV appears to be linked to both sex and gendered

patterns of labor force participation. Our results suggest that rates of non-sexual WPV were patterned across industries, and gendered labor market participation across these industries appears to be a driver of sex/gender differences in the risk of experiencing WPV. In addition, women are at increased risk for sexual violence, regardless of where they work, and the majority of perpetrators of all types of violence are men. The study of WPV in Canada, and elsewhere, could benefit from a more specific focus on these differences using a gender-based violence or feminist theoretical approach to the exploration of WPV, rather than simply adjusting for sex or ignoring differences between men and women (Fisher and Gunnison, 2001; Baines and Cunningham, 2011; Banerjee et al., 2012; Sojo et al., 2016).

### Supplementary Data

Supplementary data are available at *Annals of Work Exposures and Health* online.

### Contributors

All authors planned the study. A.B. conducted the statistical analysis and drafted the methods section of the manuscript with contributions from P.S. S.L. and P.S. interpreted the data. S.L. drafted the remainder of the manuscript with contributions from P.S. and A.B. All authors reviewed and edited the manuscript, and approved the final version.

### Funding

None.

### Competing Interests

No conflicting interests are declared. Peter M. Smith, PhD serves on the editorial board of the journal. However, the contents of this paper, including any opinions and/or conclusions expressed, are solely those of the authors.

### Ethics approval

The University of Toronto Health Sciences Research Ethics Board.

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