

Does gender/sex matter for risk and compensation of non-traumatic, work-related hearing loss?

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Background

Hearing loss is a significant contributor to disability generally and work disability specifically.¹ A Statistics Canada Health Report estimated that approximately one in five Canadian adults have at least mild hearing loss, and one in three have some hearing loss in the high frequency range.² The most common cause of hearing loss is age-related changes, but hearing loss is also caused by noise exposure at work. Another Statistics Canada Health Report³ estimated that 43% of Canadian adults have worked in noisy environments, defined as having to raise voices to communicate at arm's length; and data from the Canadian Health Measures Survey³ estimated that six million workers are vulnerable to workplace noise, defined as those not required to use hearing protection in noisy work environments and who only use hearing protection sometimes, rarely or never.

The purpose of this project was to conduct a gender/sex-based analysis of workers' compensation claims for non-traumatic hearing loss in the Canadian province of British Columbia (BC) in order to investigate differences in (1) the risk of these claims within the same occupations, and (2) differences in experiences with the adjudication of hearing loss for workers' compensation benefits.

Possible explanations for different rates and compensation experiences

Most work-related hearing loss claims occur among workers in high-intensity, noisy industries related to forestry, construction, manufacturing, or mining.^{4,5} These industries have traditionally been male-dominated and, as a result, the overall burden of work-related hearing loss in terms of total numbers is higher among men than women. However, there is no evidence to suggest that rates of work-related hearing loss (i.e. the number of cases per 1,000 workers) would be different for men and women within the same occupations. Studies also show no significant gender/sex differences in the use of hearing protection in noisy occupations (e.g. farm operators, manufacturing labourers) that would result in different rates of hearing loss, although the percentage of women wearing hearing protection was always a few percentage points higher in these studies.^{6,7}

Interestingly, while more men than women have worked in noisy environments, the proportion of women vulnerable to workplace noise, as defined above by the Canadian Health Measures Survey, is notably higher (72%) than that of men (48%). Working in noisy environments where hearing protection is not required (e.g. health care and restaurant settings) may translate to an under-recognition of work-related hearing loss.



Again, there is no evidence to suggest that the under-recognition of hearing loss by workers in vulnerable work environments would differ by gender/sex. The Canadian Health Measures Survey, which audiometrically measured hearing loss in the general population, found that the majority of Canadian adults have unrecognized hearing loss but that this did not differ by gender/sex.

Although not specific to work-related hearing loss, some studies suggest that women are more likely than men to experience challenges documenting the work-relatedness of occupational injuries and illnesses within insurance or medical systems.⁸ This may manifest as lower rates of accepted compensation claims for hearing loss or as having a longer time to an accepted claim decision for women compared to men. To our knowledge, this has not been investigated specifically for work-related hearing loss.

Approach

This project included all claims for workers' compensation in BC with a claim registration date between 2003 and 2017.⁹ All claims include accepted, disallowed (adjudicated as non-work related), and suspended claims (pending further documentation/withdrawn). Non-traumatic work-related hearing loss claims were defined using the claim diagnosis code (International Classification of Diseases v9) and the claim assignment type code of 'non-traumatic hearing loss'.

Four indicators were selected for the investigation of gender/sex based differences in compensation for work-related, non-traumatic hearing loss among workers in BC:

Sex and gender

As described in the Canadian Institutes for Health Research's *Gender, Sex and Health Research Guide*, there are no definitive, universally accepted definitions of 'gender' or 'sex'. Gender is usually associated with social constructs (roles, relationships, behaviors) for women and men and sex is usually associated with physical constructs (biology, physiology) for females and males. While gender and sex are distinct constructs, they are also significantly and complexly interrelated. For the purposes of this research, we used the sex variable recorded in the workers' compensation claims data as indicative of the biological construct for males and females as well as being highly correlated with the social construct of gender for men and women. In sum, this study investigated 'gender/sex' differences, but for ease of communication refers to differences for women and men.

Claim definitions

Accepted claims are those adjudicated as work-related and where workers receive compensation benefits for health care, lost-wages, and/or long-term disability. Disallowed claims are those adjudicated as non-work related (more likely than not caused by non-work exposures) and where workers do not receive compensation benefits. Suspended claims are those where the adjudication is pending additional documentation or workers withdraw the claim for benefits. Rejected claims were excluded as these represent workers who are not eligible/covered for workers' compensation benefits in BC.

1. The rate of accepted long-term disability compensation claims within the same occupation (a measure of risk);
2. The ratio of disallowed or suspended claims to accepted claims (a measure of the adjudication of the work-relatedness of non-traumatic hearing loss);

3. The duration of time to final eligibility decision (a measure of experience with the adjudication and compensation process); and
4. The percentage of claims with two or more eligibility decisions (another measure of experience with the adjudication and compensation process).

In order to calculate rates of work-related, non-traumatic hearing loss claims for men and women in the same occupations, the analysis included only accepted long-term disability claims for which detailed occupational codes were available (National Occupational Classification, 2006v), and included workers aged 15 to 64 years for which labour force count data were available. Counts of the number of men and women working in the same occupations during the study period in BC were obtained from Statistics Canada's Labour Force Survey. Rates were calculated as the number of hearing loss claims divided by the number of workers in an occupation, stratified by sex/gender. The rates were age-adjusted in order to make fair comparisons between gender/sex and occupation groups that might have different age distributions. Rates based on less than five claims total within an occupation by gender/sex were suppressed due to statistical and reporting requirements.

The analysis of the ratios of claims by final eligibility decision and the duration of time to final eligibility decision included all non-traumatic hearing loss claims defined solely by the claim assignment type code, as the only code available across accepted, disallowed and suspended claim types. Duration to

claim eligibility decision was calculated as the number of days from initial claim registration date to final eligibility decision date and by type of final decision (accepted, disallowed, suspended). The percentage of claims with two or more eligibility decisions was also calculated by type of decision. All analyses were stratified by gender/sex. The analyses for time to final claim eligibility decision excluded 2.5% of hearing loss claims where the claim registration date preceded the injury date.

What we found

Rates of work-related hearing loss claims by occupations

During the study period from 2003 to 2017, there were 143 and 10,204 accepted workers' compensation claims for non-traumatic hearing loss for women and men in BC, respectively. The majority (~75% to 80% for men and women respectively) of accepted claims were for health care only benefits (e.g. hearing aids) and long-term disability benefits (e.g. permanent impairments). By definition, very few hearing loss claims were for short-term disability (e.g. time loss from work).

While the total burden of hearing loss claims in terms of absolute numbers is significant among men compared to women, it is also important to investigate differences by claim rates—the number of claims per 1,000 workers for men and women within an occupation. Regrettably, an analysis and comparison of rates within occupations by gender/sex was not feasible with only 21 accepted long-term disability claims among women during the study period.

Of interest, the highest cumulative rates of accepted long-term disability claims among men during the 15 year study period were among occupations in primary industries (6.73 claims per 1,000 workers), followed by occupations in processing/manufacturing/utilities (4.73 claims per 1,000 workers) and occupations in trades/transportation/equipment operation (4.26 claims per 1,000 workers).

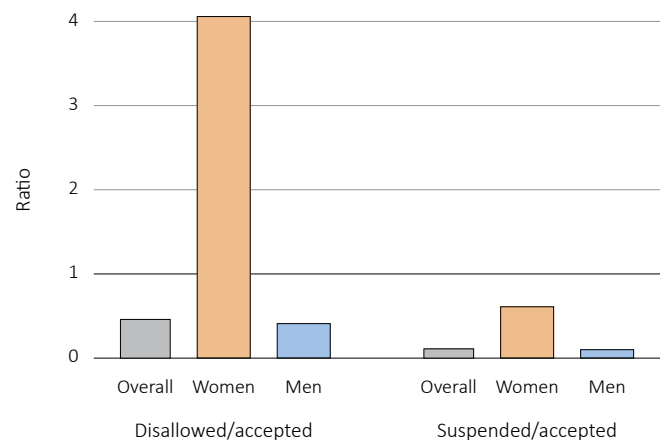
Ratio of disallowed and suspended claims

There were approximately 21,000 total claims for work-related, non-traumatic hearing loss from 2003 to 2017, of which 64% were for accepted, 29% disallowed and 7% suspended claims. Approximately one in every five of these claims were missing sex/gender coding.

Overall, the ratio of disallowed or suspended to accepted claims was 0.5 and 0.1, respectively; or in other words, for every 10 accepted claims there were five disallowed claims and one suspended claim during the study period (Figure 1).

Among all claims for women (n~800 claims), there were more disallowed than accepted claims (ratio of 4.1) or for every 40 disallowed claims there were 10 accepted claims. Conversely for men (n~15,000 claims), there were fewer disallowed than accepted claims (ratio of 0.4); or for every four disallowed claims there were 10 accepted claims. For both women and men, there were more accepted than suspended claims, but the difference was greater for women (ratio of 0.6) than men (ratio of 0.1), or for every 10 accepted claims there were six suspended claims for women compared to one suspended claim for men. In general, if women experienced the same

Figure 1 | Claim non-acceptance ratios for both genders, women, and men

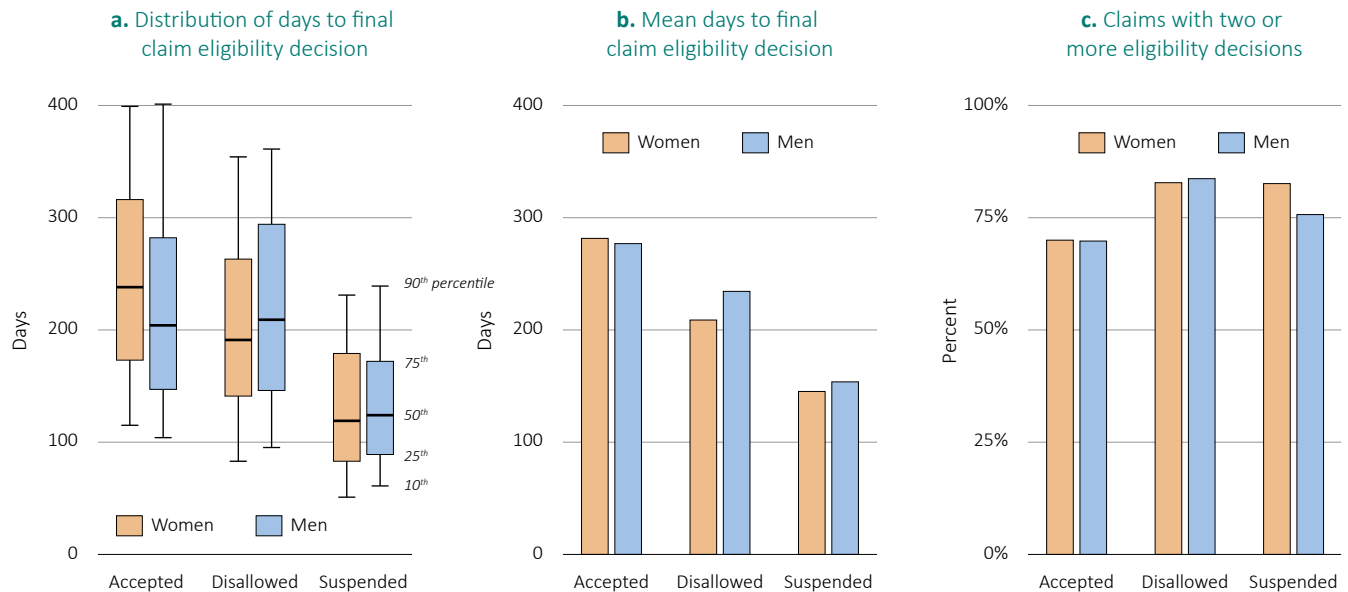


ratio of disallowed and suspended claims as men, they would have had a total of 715 accepted claims during the study period, compared to the 143 observed accepted claims.

Time to final claim eligibility decision and number of decisions

The distribution of time measured in days to final claim eligibility decision is highly skewed to the right, or stated differently, a small proportion of workers have very long decision durations that influence the mean disability duration. As an alternative to the mean, time to a final accepted claim eligibility decision was examined at the 10th, 50th, and 90th percentiles, and for the interquartile range (IQR) (25th to 75th percentiles, or the middle 50% of claims) of the distribution of days for women compared to men.

Overall from 2003 to 2017, the distribution of days to a final **accepted** claim decision was shifted to the right for women compared to men, meaning longer durations for women at almost all points of comparison at the 10th (115 days to decision versus 104 days) and 50th percentile (238 days versus 204

Figure 2 | Differences in time to claim eligibility decision for women and men

days), and for the interquartile range (173 to 316 days versus 147 to 282 days). However, time to a final accepted claim decision was comparable for women and men at 399 and 401 days at the 90th percentile, respectively (Figure 2a).

Conversely, men had longer durations to a final **disallowed** or **suspended** claim decision than women, but the gender/sex differences were not as large as that observed for **accepted** claims. For example, the distribution of days to a final disallowed claim decision was 209 days (IQR 146 to 294 days) and 191 days (IQR of 141 to 263 days) at the 50th percentile for men and women respectively, and 361 days and 354 days at the 90th percentile respectively. Similarly, the distribution of days to a final suspended claim was 124 days (IQR 89 to 172 days) and 119 days (IQR 83 to 179 days) at the 50th percentile, and 239 days and 231 days at the 90th, for men and women respectively.

The mean duration is also presented in Figure 2b as the inclusion of workers with the longest decision

durations (e.g. ‘data outliers’) can be meaningful to understanding experiences with the adjudication of work-related hearing loss claims. Overall, the mean time to a final **accepted** claim eligibility decision was longer for women (282 days, standard deviation (sd)=232 days) compared to men (277, sd=319) by five days. However, the mean duration to a final **disallowed** claim eligibility decision was longer for men (234 days, sd=209) compared to women (209, sd=106) by 25 days; and the mean duration to a final **suspended** claim decision was also longer for men (154, sd= 164) compared to women (145, sd=107) by 9 days. The sds around the mean days indicates that there is a great deal of variability in duration to claim eligibility decisions for workers with non-traumatic hearing loss claims, and more so for men than for women.

A further analysis of duration to final claim eligibility decision indicates that the mean duration has decreased over time for men (from 377 days for 2003-07 to 199 days for 2013-17) owing largely to a

decrease in claims with very long decision durations (931 days at the 90th percentile for 2003-07 to 315 days at the 90th percentile for 2013-17). The analysis of days by time periods was more variable for women with no clear pattern, although the sd around the mean has decreased indicating less variability to claim decisions over time. This analysis by time period could not be investigated by type of final claim eligibility decision due to small cell sizes for women.

Finally, the percentage of claims with two or more eligibility decisions during the 'life' of the claim was comparable for women and men for both accepted (70% each) and disallowed claims (83% and 84% respectively), but was higher for women (83%) than men (76%) for suspended claims (Figure 2c).

What do the results mean?

Taken together, the results show an overall higher burden of work-related hearing loss among men compared to women in BC based on the total number of accepted compensation claims. This is explained, in large part, by the gendered/sexed distribution of the labour force within traditionally noisy and industrial work environments. However, the higher ratios of disallowed and suspended to accepted claims among women compared to men suggests that the burden of work-related hearing loss may be higher among women than is captured by accepted workers' compensation claims. There may be an under-recognition of work-related hearing loss for women who are more likely to work in noisy environments where hearing protection is not a requirement and that are not traditionally recognized for work-related hearing loss. If women had the same accepted compensation ratios as men, we estimate there would

be approximately 50 accepted compensation claims per year for women compared to the observed 10 claims per year.

A higher ratio of disallowed and suspended claim eligibility decisions, and longer durations to a final **accepted** claim eligibility decision, suggests greater challenges in the adjudication of hearing loss as work-related for the majority of women compared to men. However, men had longer durations to a final disallowed or suspended claim decision, although the majority of claims were accepted for men compared to women. Perhaps women are more likely to suspend a claim than men when they reach a certain point in the claims experience as evidenced by their higher ratio of suspended to accepted claims, especially if they are more likely to work in an occupation or environment where hearing loss is not readily recognized as work-related by health care professionals (e.g. day cares, restaurants, hospitals). Or, perhaps men are more likely to persist in establishing their hearing loss as work-related as evidenced by longer durations to suspended and disallowed claims, especially if they work in an occupation or work environment where hearing loss has been recognized as work-related (e.g. sawmills, construction sites, mines). The ability to investigate further explanations for the observed gender/sex differences is limited by the use of administrative claims records. However, the current results are worthy of further investigation for potential gender/sex biases in the adjudication and recognition of work-related hearing loss for women generally and for reducing claim eligibility decisions for some men with very long adjudication periods specifically.

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About us

The Partnership for Work, Health and Safety (PWHS), between WorkSafeBC and the University of BC, is an innovative research unit that combines rigorous work and health research with effective knowledge translation. PWHS brings together policy-makers, researchers and data resources from national and international organizations to address current and emerging issues of work-related health in Canada. Our research is aimed at improving understanding of the causes and consequences of injuries and illness, identifying high-risk industries and occupations, and investigating the effectiveness of interventions that improve worker health, prevent occupational illness and injury, and reduce work-related disability. Our collaboration, based on best practices of knowledge transfer, enables researchers and decision-makers to work together to identify relevant questions, understand data, and produce useful information to effectively inform policy and practice.

More information

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