# Work Disability Duration: A Comparative Analysis of Three Canadian Provinces

Christopher B. McLeod[12], Robert A. Macpherson[1], William Quirke[1], Jonathan Fan[12], Benjamin C Amick III[2], Cameron A Mustard[2], Sheilah Hogg-Johnson[2], Allen Kraut[3], Mieke Koehoorn[1]

**Affiliations:**

1 Partnership for Work, Health and Safety, School of Population and Public Health, University of British Columbia, Vancouver, British Columbia, Canada
2 Institute for Work & Health, Toronto, Ontario, Canada
3 University of Manitoba, Winnipeg, Manitoba, Canada

**Correspondence to:**

Dr. Christopher McLeod
School of Population and Public Health
2206 East Mall
Vancouver, BC Canada V6T 1Z3
Tel: 604-822-0348
Email: chris.mcleod@ubc.ca

## Final Report to the Workers Compensation Board of Manitoba

## July 2017

*Supported by a grant from the Research and Workplace Innovation Program of the Workers Compensation Board of Manitoba. All inferences, opinions, and conclusions drawn in this report are those of the authors, and do not reflect the opinions of the Data Stewards*

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## Acknowledgements

We thank Dawn Mooney for assistance with the charts and figures, Suhail Marino for assistance with the research agreement and facilitating data access, and Anya Keefe for assistance with reviewing and editing drafts of this report. We thank representatives from the Manitoba Workers Compensation Board, WorkSafeBC and the Workplace Safety and Insurance Board for their guidance and assistance in accessing and understanding the compensation data and in interpreting the findings.

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# 1 Executive Summary

## Rationale and objectives

There is a growing body of evidence that safe work is good for health and that return-to-work (RTW) after work-related injury or illness can promote recovery (Franche et al. 2005; Rueda et al. 2012). Despite this, disability due to work-related injury and illness remains a significant economic and health burden in Canada and internationally. Long work disability durations and lower rates of RTW are more common among serious injury claims or claims among vulnerable populations, such as younger or older workers, or those in precarious or high-risk occupations (Fan et al. 2012; Fan et al. 2010; Lipscomb et al. 2006). Claims with long disability durations impose a considerable burden on injured workers and are costly to compensation boards and employers. Reducing long work disability duration claims is a key policy objective of Canadian workers' compensation boards (WorkSafeBC 2016; Workers Compensation Board of Manitoba 2016; Workplace Safety and Insurance Board 2016).

Some of the key drivers regarding long work disability duration are known, as well as factors that can assist in RTW, but how well these drivers are incorporated into policy and practices is less well known. Furthermore, there is often little scope within a given compensation system to evaluate whether the key characteristics and drivers of work-related injury and work disability are the same for compensation systems in other jurisdictions and whether it is possible to determine the most effective strategies of prevention and rehabilitation. Comparative research is one way of resolving these challenges.

Results from comparative research can be more powerful than those from single jurisdiction studies as they can account for additional sources of variation that may explain observed differences in RTW outcomes. Comparative research is also more conducive for identifying natural policy experiments to understand differences in outcomes (Anema et al. 2009). Single jurisdiction studies can attempt to do this using variation over time, but temporal variation is often confounded by other factors (e.g., technological change) or is too small for meaningful inference to be drawn. Comparisons across systems can provide policy-makers with evidence on what works in promoting RTW and under which circumstances.

## Research Objectives

This project analyzed long duration injury claims among three Canadian provinces: Manitoba (MB), British Columbia (BC), and Ontario (ON). Overall, the project had three main objectives:

1. To create comparable cohorts of injured workers in the three study provinces;
2. To conduct analyses investigating the trends and variations in work disability duration across these three provinces in order to identify the key intra- and inter-jurisdictional drivers; and,
3. To publish a compendium of findings that would serve as a policy and reference tool for compensation systems and other stakeholders.

## Methods

This project used administrative claim-level data maintained by WorkSafeBC (Workers' Compensation Board of British Columbia), WCB Manitoba (Workers Compensation Board of Manitoba), and WSIB Ontario (Workplace Safety and Insurance Board of Ontario). Population Data BC provided data storage and access services.[1] The project team executed Information Sharing Agreements between Population Data BC and the participating workers' compensation boards for the use of respective data for the project objectives.

The data used in the study were extracted separately for MB, BC, and ON and drawn from workers' compensation claims data with a claim registration date between 2000 and 2012. Datasets included information on: the injuries accepted for compensation, cost, benefits, health care billings, and employer characteristics. Data used for the analyses included variables on: demographics, sector of injured worker, injury characteristics, benefit payments and claim outcome. Provincial cohorts were then combined to create a single harmonized dataset.

Data on injury type were available across provinces as CSA Z795 nature of injury (NOI) codes (Canadian Standards Association 2016). The project team selected injury grouping definitions from McLeod et al. (2015) to create mutually exclusive groups of musculoskeletal injuries (strain) and acute injuries (non-strain). The project team selected three occupations within each of the health care, construction, and manufacturing industry groupings to investigate the impact of occupation on industry trends. Occupational groups within the selected industries were chosen based on well-defined job tasks with similar risks/hazards, large numbers of claims over the study period, and evidence of similar proportions across provinces. The selected codes were registered nurses, technical occupations and nurse aides in health care; truck drivers, labourers and heavy equipment operators in construction; and machine operators, assemblers and labourers in manufacturing.

[1] Attempts to include a fourth justification similar to MB were undertaken, but were not feasible during the project timeline.

To facilitate analysis, the project team developed a program that calculated the average number of cumulative work disability days paid per claim. Work disability days were then compared across province by combinations of, year, industry, occupation, gender, and injury type. The comparison revealed large differences by gender across province, prompting a more detailed analysis comparing work disability duration by gender. Cox proportional hazards models were used to examine the differences in disability days paid for men and women across provinces. Piecewise exponential models were then used to examine of how the effect of gender on claim exit was different for shorter versus longer claims.

## Main findings

- Large differences in the average number of work disability days paid are observed across jurisdictions by industry sector.
- In the health care industry, the differences observed across jurisdictions in average work disability days paid are primarily driven by strain injuries.
- In the construction industry, the differences observed across jurisdictions in average work disability days paid are primarily driven by non-strain injuries, notably fractures.
- On average, men transitioned off claim faster than women across all provinces and the differences were largest for MB and smallest in ON. Men transitioned off claim fastest during the first 19 days and there was either no difference or women transitioned off claim fastest after 130 days.

## Discussion

Inter-provincial differences in work disability duration appear to be driven by industrial sector, rather than occupation. The finding of a strong province/industry effect in the differences in disability days demonstrates the importance of using detailed claims-level data for conducting cross-jurisdictional studies. Accordingly, high- or aggregate-level comparisons of compensation outcomes may not be valid comparators of compensation system performance. Within the industry/occupation comparisons, we found a large effect by injury type. This suggests that while the conditions of work injury may be similar across provinces by industry, the approaches to RTW may vary.

The current study found differences and similarities in trends in disability duration by time across the three provinces. We examined whether these diverging trends could be explained by factors external to the compensation system. For example, other research has found that return to work is more difficult during a recession as injured workers may find that they have no job to return to and employers may be less able to offer modified work (Fortin et al. 1996; Mustard & Petch 2012). Our results find mixed support for the 2008/2009 recession as an explanation for the observed time trends in disability duration. The upward trend in disability

duration in BC is consistent with a recession effect, but the downward trend in ON is not. This is especially pertinent in construction, one of the industries most affected by the recession.

Differences in the observed number of disability days by jurisdiction may also be explained by differences in legislation, policies and practices regarding: the duty of employers and workers to accommodate or mitigate effect of a lost time injury, what constitutes a lost-time injury, and the incentive effects of different experience rating programs. In addition, changes to jurisdictional policy and practice over the study period may explain some of the differences in the disability duration time trends. We identified several policy and practice changes to the adjudication and management of claims in BC and ON that could explain the different time trends in disability duration. Notably, we did not identify any large changes in RTW practice or policy in MB during the study period. Employer claims management practices (e.g., the Compensation Advances by Employer Policy in ON) may also have had an impact on claims duration.

Gender is a key factor known to be associated with differences in disability outcomes but gender is influenced by the social, labour market and workers' compensation contexts. The findings support evidence for a cross-jurisdictional effect of gender on work disability duration and point to a need for further research to investigate why there is a difference between men and women's work disability duration, why it differs across jurisdiction, and why it differs for shorter and longer disability durations.

The difference in work disability by gender over the duration of claim is a unique result of this study. Our findings suggest that men and women may have different vulnerabilities or face different barriers that may vary across the disability duration distribution as well across jurisdiction. Possible explanations include: the degree to which modified return to work was being offered to men and women; and the effect of the severity of the injury. For less serious injuries, it may be that men return to work faster than women because workplace practices are more oriented to male workers. On the other hand, for serious injuries with a longer expected duration, gender differences in the relationship between work and identity, as well as in the degree of social support, may play some role in long absences from work adversely affecting men more than women.

This study has several strengths. It is one of the first studies in Canada to conduct detailed analyses of work disability duration across jurisdictions. Access to record-level population-based workers' compensation data over a 10-year period enabled: (1) the detailed comparison of workers' compensation outcomes for specific industries, occupations, demographic groupings and across time; (2) the adjustment for differences in how compensation data are captured across these three provinces; and, (3) sensitivity testing to test the assumptions underlying these adjustments. Notwithstanding these strengths, we cannot rule out that unaddressed issues in comparability and coverage account for some of the observed differences across jurisdictions and across time. Finally, the study is one of the first to do comparative analysis of data and outcomes across compensation

jurisdictions. As such, the findings, the findings of this study should be treated with caution, but can motivate and guide further research to examine the effect of specific policies and practices on cross-jurisdictional outcomes.

### Recommendations for Research

Based on our findings, we make the following three research recommendations:

1. **Improve the standardization and availability of national workers' compensation data:** Cross-jurisdictional reporting of workers' compensation statistics is limited in Canada. One of the major contributions of this project is the creation of comparable cohorts of injured worker claims across multiple jurisdictions. There is demonstrated interest in implementing standardized approaches to collecting workers' compensation data across Canadian provinces and current data systems and technologies make it more feasible to do so.

2. **Monitor national and international workers' compensation and RTW outcomes:** This project demonstrated the value of creating detailed comparisons of workers' compensation outcomes across Canadian provinces by industry, occupation, injury type and over time. The findings have prompted in-depth and insightful discussions on why we see differences in work disability. Expanding the descriptive analysis of comparable work disability outcomes to include more jurisdictions, years, and compensation indicators would provide a greater ability to examine future workers' compensation performance. On-going research includes an international comparative RTW study funded by CIHR and a national comparative study of RTW in construction funded by WSIB.

3. **Investigate key differences in RTW using mixed methods approaches:** This project has identified key differences in work disability outcomes across jurisdictions that may be explained by differences in jurisdictional legislation, policy and practice. The noticeable cross-jurisdiction differences found in construction and health care are an area of future research in which improvements in work disability outcomes may be achieved. Additional research using claims data may provide further insight, but administrative data can be limited in its ability to capture changes in policy and practices at the claims management and workplace level. Moreover, some key practices or outcomes may not be captured in administrative compensation data (e.g., workplace practices that facilitate the injured workers staying at work, whether an injured worker remains employed or if they can return fully to pre-injury functioning and productivity). Research that seeks to uncover detailed causal mechanisms that promote sustainable RTW will need to supplement administrative data with other data sources such as surveys of injured workers and employers, and key informant interviews.

## Recommendations for Policy

This is the first comparative study in Canada which limits the ability to provide recommendations around specific policies and practices. However, the findings of this report lead to several general policy recommendations.

1. **Consider how RTW policy and practice changes affect industry response:** The finding that there was a jurisdiction/industry effect in disability outcomes suggest that RTW policies and practices have different effects at the industry level and that there may be compensation system, employer or worker response at the industry level that promote or impede timely RTW. Implementation of changes to RTW policy and practice should consider the effect of these changes across industries and implement monitoring to track implementation at the industry level.

2. **Increase the focus on gender as a determinant of RTW:** Consistent findings from the gender analysis were that gender differences persisted even after adjusting for confounders in all provinces, that jurisdiction practices matter in reducing gender differences in work disability and that men were more likely to exit claim at short claim durations. These findings indicate that compensation boards should consider gender as key factor in claims management and RTW policy and practice. This may mean that claims managers are more conscious of the gendered structure of work and of illness and disability. In particular, claims management practices may need to address the barriers to RTW that women face for shorter duration claims.

# 2 Introduction

## 2.1 Rationale

There is a growing body of evidence that safe work is good for health and that return-to-work (RTW) after work-related injury or illness can promote recovery (Franche et al. 2005; Rueda et al. 2012). Despite this, disability due to work-related injury and illness remains a significant economic and health burden in Canada and internationally. In 2015, there were 232,629 lost-time injury and illness claims resulting in at least one day of absence from work accepted by Canada's workers' compensation jurisdictions. This included over 800 occupational injury and disease fatalities (AWCBC 2017). While the overall rates of work-related injury have declined in Canada, there have not been equivalent improvements in the duration of work disability and RTW rates (i.e. % returning to work within specific work disability duration windows). Specifically, the number of work-related lost-time claims decreased 40.7% between 2000 and 2015. In contrast, the percentage of time loss claims that transitioned off compensation benefits decreased by 3.5 percentage points for short durations (<30 days) for 0.4 percentage points for long durations (30-360 days) between 2002 to 2014 (AWCBC 2017).

Long work disability durations and lower rates of RTW are more common among serious injury claims or claims among vulnerable populations, such as younger or older workers, or those in precarious or high-risk occupations (Fan et al. 2012; Fan et al. 2010; Lipscomb et al. 2006). Claims with long disability durations impose a considerable burden on injured workers and are costly to compensation boards and employers. Reducing long work disability duration claims is a key policy objective of Canadian workers' compensation boards (WorkSafeBC 2016; Workers Compensation Board of Manitoba 2016; Workplace Safety and Insurance Board 2016). Some of the key drivers of long work disability duration are known, as well as factors that can assist RTW, but how well these factors and drivers are incorporated into policy and practices is less well known. Furthermore, there is often little scope within a given compensation system to evaluate whether the key characteristics and drivers of work-related injury and work disability are the same for compensation systems in other jurisdictions and whether it is possible to determine the most effective strategies for prevention and rehabilitation.

## 2.2 Comparative research agenda

Results from comparative research can be more powerful than those from single jurisdiction studies as they can account for additional sources of variation that may explain observed differences in return-to-work outcomes. Comparative research is also more conducive for identifying natural policy experiments to understand differences in outcomes (Anema et al. 2009). Single jurisdiction studies can attempt to do this using variation over time, but temporal variation is often confounded by other factors (e.g., technological change) or is too small for meaningful inference to be drawn. Comparisons across systems can provide policy-makers with evidence on what works in promoting RTW and under which circumstances.

Comparative research has the potential to more clearly identify the drivers of disability duration than single jurisdiction studies through the identification of the jurisdictional, sectoral, and demographic components of disability and RTW. A key demographic characteristic that has received increasing research attention is gender. Studies have found important gender differences in work disability duration, evident in the analysis of different likelihoods of claimants returning to work (De Rijk et al. 2008), transitioning off work disability benefits (Lederer & Rivard 2014; Collie et al. 2016), and transitioning onto permanent disability pension (Gjesdal & Bratberg 2002; Gjesdal & Bratberg 2003; Gjesdal et al. 2011). However, gender-specific studies on work disability tend to focus on single jurisdictions and, therefore, ignore the possibility that the effect of gender may differ by jurisdiction. Cross-jurisdictional studies are valuable because they help to tease out the impact of differences in health care systems, workers' compensation systems, legal systems, public policies, as well as social and cultural values (Lederer & Rivard 2014).

Comparative research on work-related injury has largely been conducted using aggregate-level analysis and has been primarily used to benchmark workers' compensation system performance. Examples of benchmarking comparative studies include: the Work Loss Data Institute's (WLDI) State Report Cards for Workers' Compensation in the United States and the Association of Workers' Compensation Boards of Canada's (AWCBC) Key Statistical Measures (KSMs). Derived from administrative data held by provincial/territorial workers' compensation boards, the AWCBC KSMs are calculated by individual compensation boards using accepted national definitions and coding standards and are reported to the AWCBC at the aggregate level. Statistics are accessible to the general public and include measures of injury frequency (number of claims reported, number of fatalities accepted, injury rate per 100 workers, workforce coverage), severity (average duration of claim, average impairment award percentage, percentage of claims on time loss benefits post-injury), and accounting/financial measures (yearly benefit costs and payments, benefit liabilities, assessment revenue, premium revenue), for jurisdiction and across multiple years.

There have been some attempts to examine the impact of policy settings on RTW outcomes in a cross-jurisdictional context. Anema and colleagues (2009) examined the influence of policy variables on sustainable

RTW, using a prospective cohort of workers with low-back pain across six countries. Variables examined included: income loss when reporting sick; waiting periods; medical certificate requirements; degree of work incapacity required for eligibility; risk of dismissal; and no or late entitlements to long-term disability benefits. The presence of required medical certificates for sickness benefits, and no or late entitlement to long-term disability benefits, were associated with earlier sustained RTW; whereas, the presence of a high minimum of work incapacity required for long-term disability benefits was associated with delayed sustainable RTW.

Research has also been undertaken to examine the features of workers' compensation systems that relate to equity and fair compensation for injured workers. For example, Lippel (2012) examined compensation policies across thirteen Canadian provinces that offered the broadest protection for workers. They propose that these policies may serve as benchmarks to which compensation systems can be compared internationally. The composite of characteristics included coverage (e.g., industries and workers covered); entitlement (e.g., eligible injuries and illnesses); benefits (e.g., minimum and maximum levels); rehabilitation (e.g., early RTW, access to support); health care (e.g., access to and coverage); administration (e.g., appeal procedures, oversight mechanisms); financing (e.g., who pays, experience rating); and job protection (e.g., duration of protection).

Other comparative studies using Canadian data identify jurisdictional differences suggestive of system, policy or regulatory influences. This includes, work-injury rates among Canadian adolescents (Breslin et al 2006), injury rates in health care (Yassi et al 2005), claim rates during the recession (Mustard and Petch, 2000), and workplace fatalities (Sharpe and Hardt, 2006). However, no Canadian studies have examined differences in work disability or return to work using claim-level data.

Comparative research in Australia utilised the National Dataset of Compensation Based Statistics (NDS) compiled by Safe Work Australia to which each Australian workers' compensation jurisdiction provides data annually. The findings revealed that there are large differences in work disability duration between Australian workers' compensation jurisdictions and that these differences remain after considering the impact of other factors known to influence work disability duration, including age, gender, nature of injury, occupation, industry, remoteness, service accessibility and socio-economic status. Moreover the magnitude of the jurisdictional effect is equal to, or more substantial than, that associated with other factors known to result in longer duration compensation claims (e.g., mental health claims) (Collie et al. 2015; Collie et al. 2016).

## 2.3 Research Objectives

This project analyzed long duration injury claims among three Canadian provinces: Manitoba (MB), British Columbia (BC), and Ontario (ON). WCB Manitoba (Workers Compensation Board of Manitoba), WorkSafeBC (Workers' Compensation Board of British Columbia), and WSIB Ontario (Workplace Safety and Insurance Board of Ontario) are responsible for the delivery of compensation and return-to-work services in these provinces.

Overall, the project had three main objectives:

1) To create comparable cohorts of injured workers in the three study provinces;

2) To conduct analyses investigating the trends and variations in work disability duration across these three provinces in order to identify the key intra- and inter-jurisdictional drivers; [2] and,

3) To publish a compendium of findings that would serve as a policy and reference tool for compensation systems and other stakeholders.

[2] These objectives were revised from the original grant due to data limitations that prevented us from examining differences in long-duration and serious injury claim rates. We were unable to derive comparable denominators of the covered workforce in each province due to the differences proportion of the workforce covered in each province.

# 3 Methods and Data[3]

## 3.1 Data Sources

We used administrative claim-level data maintained by WorkSafeBC, WCB Manitoba, and WSIB Ontario was used for this project. Relevant data fields were identified through an environmental scan of available data sources. In-person and teleconference meetings with compensation board analysts from each province were conducted to confirm field availability and facilitate data access.

Population Data BC provided data storage and access services. The project team executed Information Sharing Agreements between Population Data BC and the participating workers' compensation boards for the respective data. A service agreement was also executed with Population Data BC in order to house and store project data within Population Data BC's secure research environment (SRE). The SRE is a central server only accessible through a firewall via an encrypted Virtual Private Network (VPN) and use of a SecurID token for authentication. Use of the data for research purposes was governed by an agreement between the data stewards and the researchers. All personal identifiable information was removed from the data files provided to the researchers and replaced with anonymous study identifiers (Population Data BC 2016b; Population Data BC 2016a). The Behavioural Research Ethics Board of the University of British Columbia reviewed and approved the study protocol and procedures (certificate# H13-00132).

Data were extracted separately for each province and were drawn from workers' compensation claims data with a claim registration date between 2000 and 2012. Received datasets included information on: the injuries accepted for compensation, cost, benefits, health care billings, and employer characteristics. Data used for the analyses included variables on: demographics (age, sex), sector (occupation, industry), injury characteristics (nature of injury, cause, source, part of body, date of injury), benefit payments (benefit type, paid from, paid to, time loss days paid) and claim outcome (lost-time claims, work disability duration).

[3] This section provides a summary of the methods. A comprehensive description of data preparation steps, decision rules and analytical methods can be found in the accompanying document, 'Methods and Results Appendix'.

## 3.2 Creation of the Harmonized Dataset

### 3.2.1 Data Preparation

The project team completed quality assurance, data cleaning and data adjustments to create comparable cohorts of injured workers in each of the three provinces. Provincial cohorts were then combined to create a single harmonized dataset for analysis of the research objectives. The harmonized dataset was created in five stages:

1) Preparation of claims data

2) Preparation of benefits data

3) Generation of the cohort

4) Creation of the harmonized dataset, and

5) Creation of the final analytical files

Stage 1 – preparation of claims data: the project team prepared the claims data and derived analytical variables. Claims were restricted to injury years between 2002 and 2012 providing a 10-year data cohort for accepted, non-fatal, time-loss claims in each province. Analytical variables included: injury year, gender, age, occupation, industry, and injury type. Industry groupings were created from a detailed mapping of provincial classification units. Health care, construction, and manufacturing were selected for further investigation based on high proportions of current compulsory registration activities, large numbers of claims over the study period. . Concordance tables were applied to standardize occupational classification systems across provinces. Injury types were created in accordance with definitions from previous research (McLeod et al. 2015).

Stage 2 – preparation of the benefits data: the project team cleaned the benefits data, assessed differences in the work disability days paid measure between provinces, and adjusted the work disability days for comparability. The following four key differences were identified in the accrual of work disability days paid[4] across provinces from the transactional benefits data.

1. In BC, work disability days paid were derived from Section 29 (partial temporary) and Section 30 (total temporary) disability payments, which excluded any long-term disability or vocational rehabilitation benefits. In MB, work disability days paid were derived from compensation days paid that where noted as total disability benefits and temporary partial benefits. In ON, work disability days was derived from the Loss of Earnings (LOE) benefit payment.

[4] The work disability days paid measure counted the number of days paid to an injured worker for time loss resulting from total or partial disability.

2. In BC and ON, work disability days paid were recorded as complete days irrespective of whether a worker was fully off work or had returned to work but was working modified duties or hours. In MB, work disability days paid were recorded as complete days for fully disabled workers, but recorded as partial days for workers on modified duties depending on time at work each day. This difference decreased the number of work disability days paid in MB relative to BC and ON. The project team adjusted partial work disability days to full days in MB to reflect the BC and ON measures.[5]
3. The project team determined that the majority of claims were based on five-day workweeks across all provinces. However, alternative workweeks were noted, including a larger proportion of claims in BC and MB based on seven-day workweeks. This accounting difference increased the number of work disability days paid in BC and MB in comparison to ON. Claims across provinces were standardized to a five-day workweek (e.g., a claim on a seven-day workweek that accrued seven days paid over a one week period was assigned a value of five days paid).[6]
4. In ON, a number of payments were observed in the data with lump sum payments. These payments[7] pertain to 'locked in' claims in ON, in which a final review of benefit at 72 months post injury/illness has occurred, as per Bill 99, Workers' Compensation Reform Act, 1996. These payments do not represent short-term work disability and are not comparable to short-term disability payments in BC and time-time loss payments in MB. These payments were removed by restricting the ON summary period to six years post-injury (time at which claims become locked-in).
5. The project team removed days paid for vocational rehabilitation (VR) services from the work disability days paid measure where possible. VR includes benefit payments separate from time loss payments to injured workers and employers for work assessments, worksite modifications, and other work transition services. VR days were removed from BC by summarizing 'short-term disability' benefits only, and removed from MB by summarizing 'compensation' benefits only. VR days were not removed from the ON data due to limitations in the fields available for the project. Sensitivity testing was conducted to assess potential bias resulting from inclusion of VR for ON.[8]

Following these four adjustments, the project team created the outcome measure by summarizing work disability days paid over a one-year time window post-injury. To do this, work disability days were summarized across payment periods by dropping benefit records that occurred after one calendar year and summarizing the remaining benefit records that occurred within the year. Where payment periods straddled the one-year threshold, days paid were pro-rated assuming a uniform time loss distribution.

[5] The detailed decision rules are outlined in section 6.1.1 of the 'Methods and Results Appendix'.
[6] The detailed decision rules are outlined in section 6.1.2 of the 'Methods and Results Appendix'.
[7] Typically, these claims involve large work disability days paid (e.g., 2000 days, 3000 days).
[8] The impact of including VR payments is discussed in section 6.1.3 in the 'Methods and Results Appendix'.

Stage 3 – generation of the cohort: the project team merged the benefit and cost files by province and applied inclusion and exclusion criteria. Short-term disability (STD) and long-term disability (LTD) claims were included in BC (but only STD payments were included for the LTD claims), and time-loss claims were included in MB and ON. Claims were excluded for workers less than 15 years old, greater than 90 years old or claims missing key explanatory variables.

Stage 4 – creation of the harmonized dataset: the project team combined the provincial datasets to create a single harmonized dataset. The harmonized dataset consisted of one record per claim, with each row containing variables for province, claim identifier, summary days, and analysis variables in separate columns.

Stage 5 – creation of the final analytical file: the project team applied final restrictions to create the work disability duration and gender analytical files. The work disability duration file was created by restricting claims to only those with dates of injury between 2007 and 2011. The final cohort was restricted to these years to limit the effect of legislation and data coding changes that occurred prior to 2007. Claims with dates of injury from 2012 were excluded from the analysis to allow for a one-year follow-up period. Further exclusions included claims with less than one full time loss day paid and claims for non-traumatic injuries and disorders (occupational diseases removed).[9] An additional exclusion was made for the final gender analytical file to keep only claims with non-missing occupation codes.

## 3.3 Analytical Approach

### 3.3.1 Selection of injury type, industry, and occupational variables

**Injury Type**

Data on injury type was available across provinces as CSA Z795 nature of injury (NOI) codes (Canadian Standards Association 2016). The project team selected injury grouping definitions from McLeod et al. (2015), as this coding was based exclusively on NOI codes available in the comparative dataset. This definition created mutually exclusive groups of musculoskeletal injuries (strain) and acute injuries (non-strain). Strain injuries included strains and sprains of the back, lower or upper limb, including carpal tunnel syndrome, bursitis, tendinitis, or tenosynovitis. Non-strains included amputations, fractures, dislocations, concussions, cold or heat exposures, burns, abrasions/contusions/lacerations or hernias. The project team further categorized strain

[9] Coverage and compensation processes of disease claims differ significantly across jurisdictions and across time within jurisdictions. To create as comparable cohorts as possible, we restricted the claims to traumatic injuries based on WorkSafeBC's definition of traumatic injuries and further restrictions discussed in section 4.1.1 of the 'Methods and Results Appendix'.

injuries by back strains and non-back strains using CSA Z795 part of body coding and non-strain injuries by NOI codes for fractures, concussions, and other non-strain injuries.[10]

**Industry**

In 2011, 94% of the BC workforce was covered by the provincial worker's compensation system, whereas 72% and 73% of the MB and ON workforces were covered, respectively (AWCBC 2017). This difference in coverage meant that there were industry and occupations in the BC dataset that were not in the MB and ON datasets. As a result, work disability durations may have been influenced by differences between covered and non-covered workers in: injury severity, RTW incentives, work accommodation opportunities and other factors.

To address the difference in coverage, the project team mapped provincial classification units (CU) to the broad industry groupings of construction, primary resources, manufacturing, transportation and warehousing, trades, health care, services and self-insurers. Each CU was assigned a value of 'compulsory' if the coverage was compulsory or 'non-compulsory' if coverage was optional or included exemptions or relevant exclusions. Industry groupings were assessed for levels of compulsory coverage and claim counts were tabulated by injury year, occupation and gender. The health care grouping captured a specific subset defined by the project team as institutional acute and long-term care. To create a specific set of claims representing similar working conditions and environments, the team excluded social services, specialized homes, and residential care providing personal care only from the definition.[11] The construction and manufacturing industry groupings captured all covered activities for each province.

**Occupation**

The project team selected three occupations within each of health care, construction, and manufacturing industry groupings to investigate the impact of occupation on industry trends. Occupational groups within the selected industries were chosen based on well-defined job tasks with similar risks/hazards, large numbers of claims over the study period, and evidence of similar proportions across provinces. The selected codes were registered nurses, technical occupations and nurse aides in health care; truck drivers, labourers and heavy equipment operators in construction; and machine operators, assemblers and labourers in manufacturing. Three- and four-digit National Occupational Classification (NOC) 2006 codes were tabulated by highest to lowest frequencies within industry groupings over the study period. Frequencies were compared across provinces to investigate similar proportions of groupings.[12] Table 1, summarizes the key variables examined.

[10] A full list of injury type codes can be found in section 7.1 of the 'Methods and Results Appendix'.
[11] See section 6.5 of the 'Methods and Results Appendix' for a full description of industry groupings and classification units.
[12] See section 7.3 of the 'Methods and Results Appendix' for a full list of NOC 2006 groupings and codes.

Table 1 Summary of key variables examined

| | Industry | | | |
|---|---|---|---|---|
| | **All industry** | **Health care** | **Construction** | **Manufacturing** |
| **Injury year** | 2007, 2008, 2009, 2010, 2011 | | | |
| **Injury type** | Strain injuries (back strain injuries, non-back strain injuries) | | | |
| | Non-strain injuries (fractures, concussions, other non-strain injuries) | | | |
| **Occupations within industry** | All occupations | Registered nurses | Heavy equipment operators | Machine operators |
| | | Licensed practical nurses and other technical occupations | Trade helpers and labourers | Mechanical, electrical and other assemblers |
| | | Nurse aides, orderlies, and other assisting occupations | Truck drivers | Labourers |

### 3.3.2 Creation of the work disability days program

The project team developed a program that calculated the average number of cumulative work disability days paid per claim by any combination of province, year, industry, occupation, gender, and injury type. For example, running the program entering "manufacturing", "strain injuries", "heavy equipment operators", "2007-2011", and "one-year summary" created a secondary dataset summarizing work disability days paid for the specified claims over the one-year period by province. Work disability days paid over 1 year ranged from 1 to 260 days (approximately 1 working year for a worker on a 5 day workweek). This calculation was also made for the 0-<6 month (1 to 129 days) and 6-12 month periods (130 to 260 days) to determine the impact of short- versus long-term claims. The percentage of claims was also presented with cumulative work disability days greater than or equal to select threshold values over one year.

## 3.4 Gender Analysis[13]

### 3.4.1 Survival analysis

Building on the work disability days analysis (described above), the gender analysis used Cox regression models to perform multivariable survival analysis of the effect of gender on disability duration, adjusting for all of the other variables in the study. Survival analysis models the time from the start of follow-up until an 'event' or 'failure' or equivalently, the length of an 'episode'. This represents the amount of time an individual is 'at risk' or has conversely 'survived'. In the context of the current study, an injured worker was followed from the start date of their claim until the end of the claim, defined as claim exit. This represents the injured worker's time-

[13] While workers' compensation data record sex and not gender, we apply a gender perspective in order address the complex relationships between sex, work-related factors and social circumstances (family roles, employment status, social class).

at-risk for work disability. Survival analysis calculates the hazard rate to represent how likely an injured worker is to exit their claim given they are still on claim.

### 3.4.2 Cox proportional hazards model

The Cox proportional hazards model rests on the assumption that the hazard function for each individual claim and all variables are proportional and a constant multiple of a common baseline hazard. Often regression diagnostics indicate that this key property does not hold for many variables (e.g., the hazard for women is not proportional to the hazard for men) and the basic survival model may provide biased estimates of the effect of these variables. There are three basic approaches to deal with violations of non-proportionality. One, fit a stratified model that allows for the estimation for separate baseline hazards for each strata. Two fit an extended Cox model that includes a time-by-covariate interaction to represent a time-varying effect. Three, fit a piecewise model that partitions the time axis into shorter time intervals in which the hazard rate is assumed to be constant within each interval but can vary arbitrarily between the intervals (Royston & Lambert 2011). Researchers have shown that gender stratification, despite lowering statistical power, can identify gender-specific effects that are not evident when adjusting for gender as a confounder (Messing & Mager Stellman 2006; Messing et al. 2009; Silverstein et al. 2009; Lederer et al. 2012; Lederer & Rivard 2014). While stratification can address the violation of the proportional hazards assumption and allow for the likelihood of a transition off claim to be estimated for women or men, separately, it does not permit us to compare the effect of gender on transitioning off work disability benefits for women and men, together (Singer & Willett 2003). While an extended Cox model with a time-by-covariate interaction enables us to estimate the hazard ratio at different time points, an inappropriate choice for the relationship with time (for example, linear, quadratic, cubed) can result in model misspecification and result in incorrect estimates (Bellera et al. 2010).

The proportional hazards assumption of the models was examined for all variables graphically (Kaplan-Meier survivor plots and log-minus-log plots) and statistically (using Schoenfeld residuals tests and covariates with interactions of time in the Cox models). The tests indicated violations of the proportional hazards assumption, particularly for gender, injury type, and injury year. Because the focus of the analysis was to examine the effect of gender on work disability duration, only gender was interacted with time in the final models.

### 3.4.3 Modeling strategy

The analysis was undertaken in three main steps, by modeling: (1) the effect of gender for all injuries and occupations in each of the separate provinces; (2) strain injuries (including back strain injuries) because previous research found gender differences in these injury types: and, (3) strain injuries within particular occupations associated with high risks of strain injuries where there were similar proportions of workers of male and female workers. The following occupations were examined: nurse aides, orderlies, and other assisting occupations

(NOC 2006: 3413/3414); chefs and cooks (NOC 2006: 624); retail salespersons (NOC 2006: 642); and janitors, caretakers and building superintendents (NOC 2006: 6663).[14]

During the second and third steps, hazard ratios (HRs) and 95% confidence intervals (CI) were obtained for gender on a claim transitioning off time loss benefits in the following intervals:

- 0-19 days (<1 month)
- 20-64 days (1-<3 months)
- 65-129 days (3-<6 months)
- 130-260 days (6-12 months)

This enabled us to examine in more detail if the effect of gender on the likelihood of transitioning of claim was different for short duration claims compared to long duration claims. HRs were statistically significant at the 95% confidence level where the confidence intervals did not overlap with the value of one. The HRs can be interpreted as the difference in the relative risk of transitioning off claim for women compared to men. To compare the absolute difference in the likelihood of transitioning off claim by gender and by province, we calculated predicted survival estimates based on the underlying model estimates. These were estimates were standardized to 1,000 claims to make them comparable to the descriptive analysis.

[14] See section 4.1.1 and 7.3 of the 'Methods and Results Appendix' for further detail.

# 4 Results

## 4.1 Comparative results

### 4.1.1 Study population

The final harmonized claim-level file consisted of 624,402 accepted time-loss claims for traumatic injuries between the years 2007 and 2011. Of these accepted time-loss claims, BC accounted for 258,247, while MB and ON accounted for 70,221 and 295,934 claims, respectively.

### 4.1.2 Adjustments to the work disability days measure

Table 2 shows the overall unadjusted and adjusted work disability days paid measure for the three provinces. In the unadjusted measure, the average number of work disability days was 37.4, 28.8 and 30.6 for BC, MB and ON, respectively. The fully adjusted work disability days paid measure for the overall comparison decreased the one-year overall average for MB and BC by 3 and 0.3 work disability days, respectively, and increased the ON measure by 0.1 work disability days. This resulted in a fully adjusted overall measure of 34.4 for BC, 28.5 for MB and 30.7 for ON. In BC and ON, days paid were adjusted for workweeks. In MB, the workweek adjustment decreased the average work disability days paid by 2.6 and the partial days adjustment increased the average work disability days paid by 2.4 (Table 2).[15] Larger differences between the unadjusted and adjusted measures were observed by industry, notably in health care (see Table 4 of the 'Methods and Results Appendix').

[15] Note: that the adjustment for partial days and workweek may not occur for the same claim.

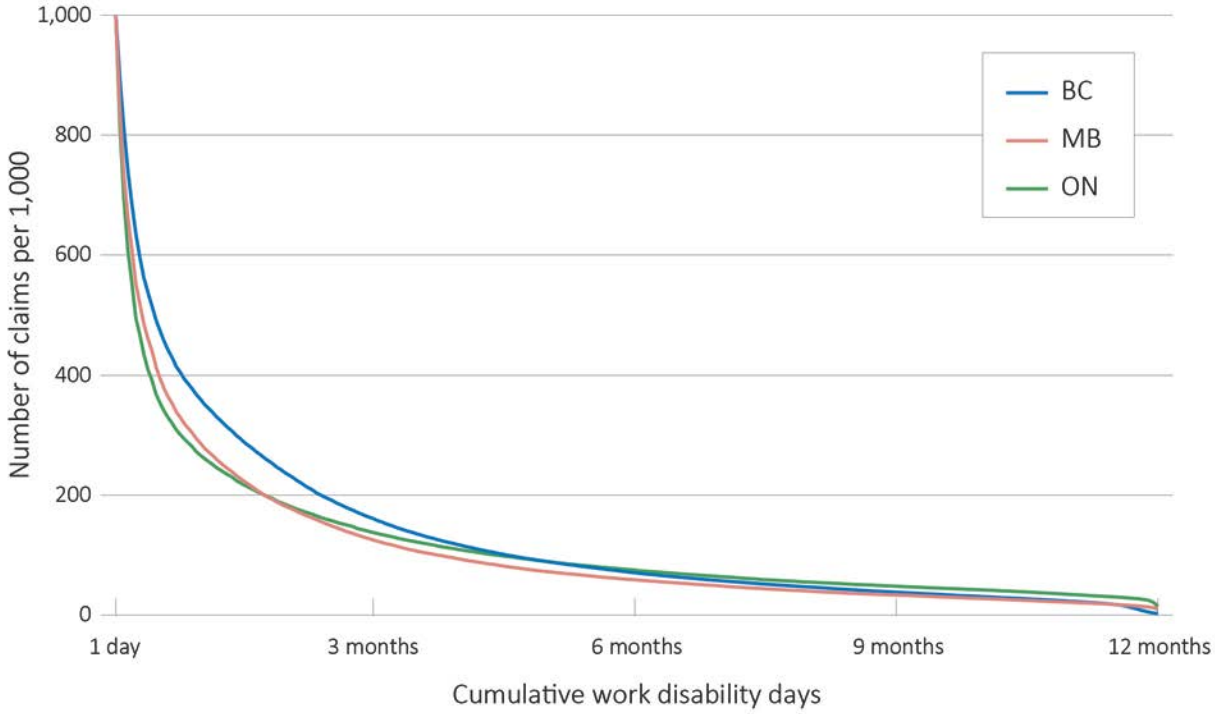
Table 2 Outcome variable and adjustments

| | All industries | | | | | |
|---|---|---|---|---|---|---|
| | Unadjusted | | | Adjusted for partial days | | |
| Work disability days | BC (n=258,247) | MB (n=70,221) | ON (n=295,934) | BC (n=258,247) | MB (n=70,220) | ON (n=295,934) |
| 0-<6 months | 31.0 | 24.0 | 24.2 | 31.0 | 25.7 | 24.2 |
| 6-12 months | 6.5 | 4.8 | 6.4 | 6.5 | 5.5 | 6.4 |
| 1 year sum | 37.4 | 28.8 | 30.6 | 37.4 | 31.2 | 30.6 |
| | Adjusted for weekday length | | | Fully adjusted | | |
| Work disability days | BC (n=258,246) | MB (n=70,208) | ON (n=295,934) | BC (n=258,246) | MB (n=70,208) | ON (n=295,934) |
| 0-<6 months | 29.2 | 22.3 | 24.2 | 29.2 | 24.0 | 24.2 |
| 6-12 months | 5.2 | 3.9 | 6.5 | 5.2 | 4.6 | 6.5 |
| 1 year sum | 34.4 | 26.2 | 30.7 | 34.4 | 28.5 | 30.7 |

Notes: Work disability days represents the average work disability days paid per claim summed over one-year calendar period post-injury (0-6 months, 6-12 months, and 0-12 months). Unadjusted = raw data. Partial day adjusted = adjusted for the presence of partial days in the underlying transactional data. Workweek adjusted = adjusted for the differences in the number of work disability days paid over a given calendar period depending on the workweek.

The 'fully adjusted cumulative work disability days paid' variable is presented as a duration curve for a group of 1,000 standardized time-loss claims for all industries, injuries, and occupations (Figure 1). All claims began on 1 work disability day and claimants transitioned off work disability benefits moving out towards 12 months. ON claimants transitioned off work disability benefits the quickest compared to BC and MB, particularly in the first two weeks. MB claimants began transitioning off work disability benefits at the fastest rate around two months.

Figure 1 Cumulative work disability days paid



### 4.1.3 Average cumulative work disability days per claim by all injuries and industry

Overall, the fully adjusted average work disability days paid per claim over 1 year was 34.4 for BC, 28.5 for MB, and 30.7 for ON (Figure 2a).

By industry, the average work disability days paid were highest for MB in health care (BC: 35.9; MB: 36.9; ON: 23.4), for ON in construction (BC: 41.7; MB: 35.2; ON: 51.7) and for ON in manufacturing (BC: 32.5; MB: 20.3; ON: 33.2) (Figures 2b, 2c, and 2d). By injury years between 2007 and 2011, work disability duration levels were constant in MB, increasing in BC, and decreasing in ON (Figure 2a). Different time trends in injury year emerged by industry, notably decreasing durations in health care across all provinces (Figure 2b) and increasing durations in the construction industry in BC (Figure 2c).

- In health care, the markedly lower average duration for ON was driven by a rapid initial rate of transition where nearly half as many claims in ON were receiving work disability benefits at one month compared to BC (Figure 2b)
- In construction, the number of work disability days paid between 0-6 months was similar between BC and ON. However, ON accrued nearly double the average number of work disability days paid between 6-12 months, resulting in a total of 10 more work disability days paid on average.
- In manufacturing, work disability days paid was similar for BC and ON but markedly lower in MB. The percentage of manufacturing claims receiving work disability benefits in MB at three months was half that of BC and ON (Figure 2d).
- The largest variability across industries within province occurred between construction and health care for ON and between construction and manufacturing for BC and MB.

Overall, by injury type, work disability days paid was larger for strain injuries (BC: 35.7; MB: 30.3; ON: 30.9) (Figure 3) than non-strain injuries (BC: 32.4; MB: 25.1; ON: 30.3) (Figure 4).

- By industry, trends in injury type remained similar except for health care where claims for non-strain injuries (BC: 25.9; MB: 28.8; ON: 20.2) (Figure 4b) were far fewer than for strain injuries (BC: 38.1; MB: 38.5; ON: 24.4) (Figure 3b).
- By year and injury type, strain injuries in construction tended to have a greater downward trend in ON and a greater upward trend in BC (Figure 3c), while the trend for non-strain injuries was relatively stable for all provinces and industries (Figures 4a-4d).

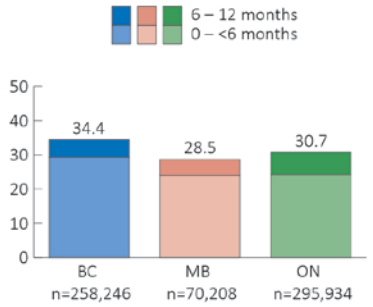
# Figure 2 All injuries, by industry

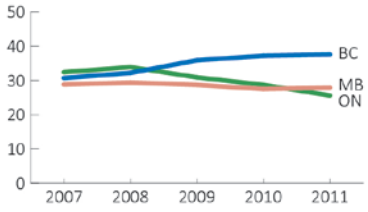
% on claim at work disability thresholds, 2007-2011

Average cumulative work disability days per claim, 2007-2011

## 2a All industries

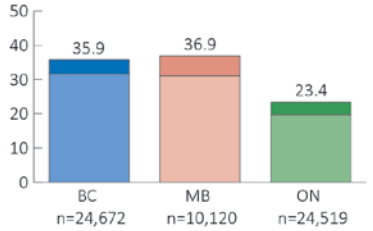
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 69% | 61% | 55% |
| 2 weeks | 52% | 44% | 39% |
| 1 month | 38% | 31% | 28% |
| 3 months | 16% | 13% | 14% |
| 6 months | 7% | 6% | 8% |
| 9 months | 4% | 3% | 5% |
| 12 months | 0% | 1% | 2% |

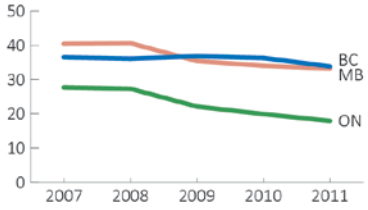



## 2b Health care industry

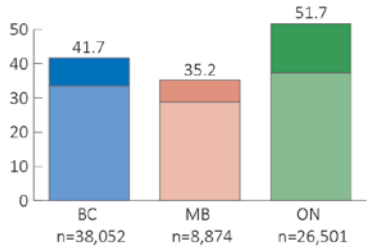
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 68% | 50% |
| 2 weeks | 59% | 53% | 35% |
| 1 month | 46% | 40% | 24% |
| 3 months | 16% | 18% | 10% |
| 6 months | 6% | 8% | 5% |
| 9 months | 3% | 5% | 3% |
| 12 months | 0% | 1% | 1% |

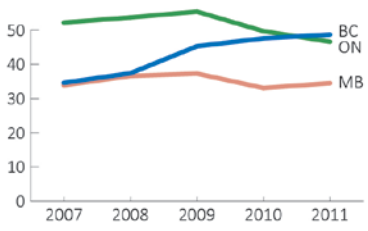



## 2c Construction industry

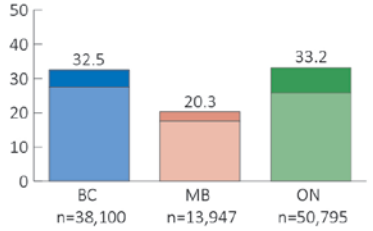
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 69% | 67% | 65% |
| 2 weeks | 53% | 50% | 51% |
| 1 month | 40% | 36% | 41% |
| 3 months | 20% | 16% | 24% |
| 6 months | 10% | 8% | 16% |
| 9 months | 6% | 5% | 11% |
| 12 months | 1% | 2% | 4% |

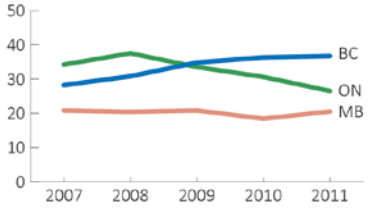



## 2d Manufacturing industry

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 65% | 53% | 56% |
| 2 weeks | 48% | 36% | 41% |
| 1 month | 35% | 23% | 29% |
| 3 months | 15% | 8% | 15% |
| 6 months | 7% | 4% | 9% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 2% |



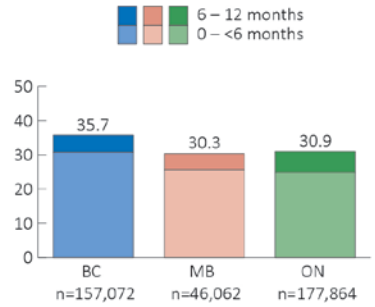
# Figure 3 Strain injuries, by industry

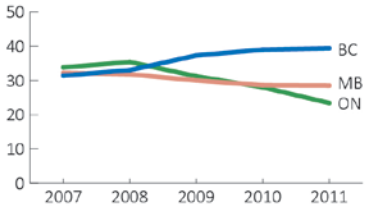
% on claim at work disability thresholds, 2007-2011

Average cumulative work disability days per claim, 2007-2011

## 3a All industries

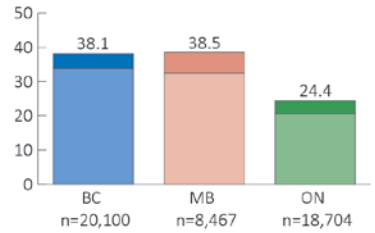
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 73% | 66% | 58% |
| 2 weeks | 56% | 48% | 41% |
| 1 month | 41% | 33% | 29% |
| 3 months | 17% | 13% | 14% |
| 6 months | 7% | 6% | 8% |
| 9 months | 4% | 4% | 5% |
| 12 months | 0% | 1% | 1% |

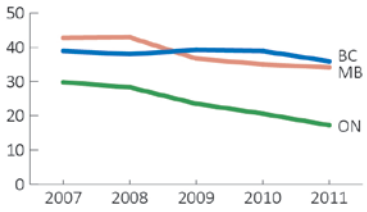



## 3b Health care industry

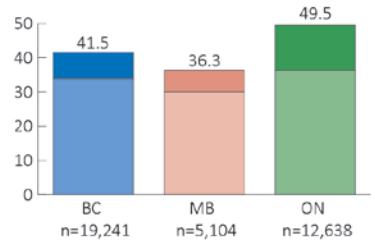
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 79% | 71% | 53% |
| 2 weeks | 63% | 56% | 36% |
| 1 month | 50% | 42% | 25% |
| 3 months | 17% | 19% | 11% |
| 6 months | 6% | 8% | 5% |
| 9 months | 3% | 5% | 3% |
| 12 months | 0% | 1% | 1% |

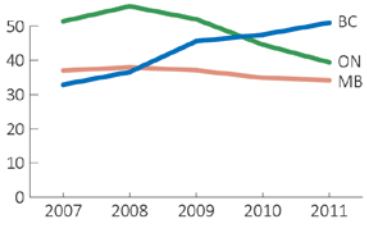



## 3c Construction industry

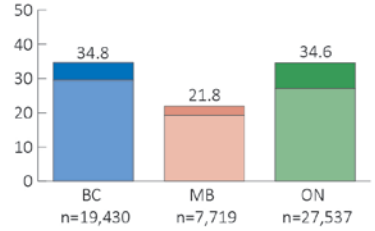
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 73% | 65% |
| 2 weeks | 57% | 54% | 49% |
| 1 month | 41% | 38% | 39% |
| 3 months | 20% | 17% | 24% |
| 6 months | 10% | 8% | 15% |
| 9 months | 6% | 5% | 10% |
| 12 months | 1% | 1% | 3% |

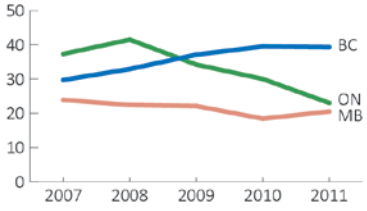



## 3d Manufacturing industry

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 71% | 59% | 58% |
| 2 weeks | 53% | 40% | 42% |
| 1 month | 39% | 25% | 30% |
| 3 months | 16% | 9% | 16% |
| 6 months | 7% | 4% | 9% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 1% |



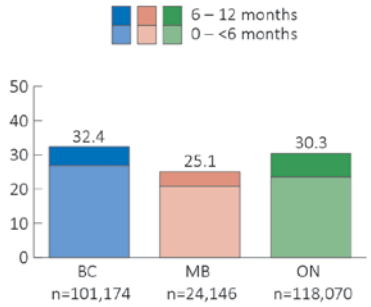
# Figure 4 Non-strain injuries, by industry

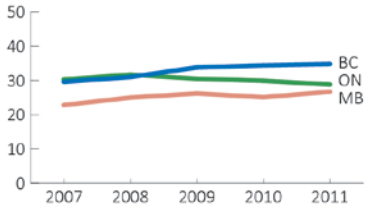
% on claim at work disability thresholds, 2007-2011

Average cumulative work disability days per claim, 2007-2011

## 4a All industries

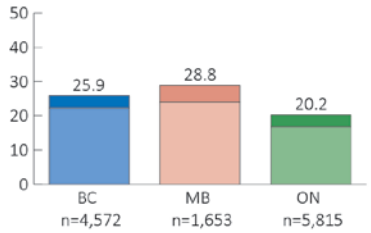
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 61% | 52% | 51% |
| 2 weeks | 44% | 37% | 37% |
| 1 month | 32% | 26% | 27% |
| 3 months | 16% | 11% | 14% |
| 6 months | 7% | 5% | 8% |
| 9 months | 4% | 3% | 5% |
| 12 months | 0% | 1% | 2% |

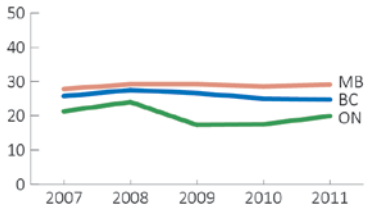



## 4b Health care industry

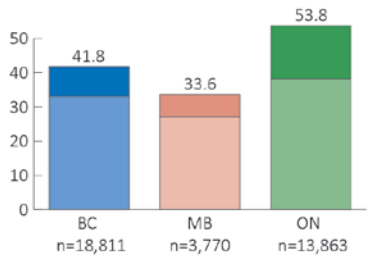
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 56% | 54% | 43% |
| 2 weeks | 39% | 40% | 29% |
| 1 month | 28% | 30% | 20% |
| 3 months | 12% | 14% | 9% |
| 6 months | 5% | 6% | 4% |
| 9 months | 3% | 4% | 3% |
| 12 months | 0% | 1% | 1% |

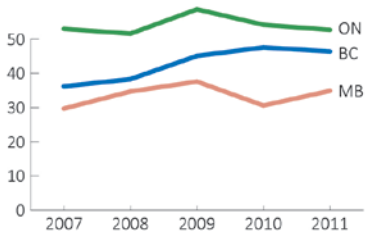



## 4c Construction industry

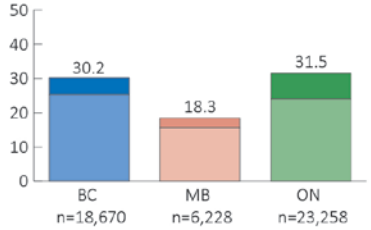
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 64% | 60% | 65% |
| 2 weeks | 49% | 45% | 52% |
| 1 month | 38% | 34% | 42% |
| 3 months | 21% | 15% | 25% |
| 6 months | 11% | 8% | 16% |
| 9 months | 7% | 5% | 12% |
| 12 months | 1% | 2% | 5% |

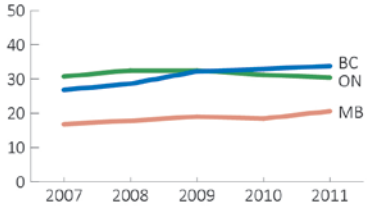



## 4d Manufacturing industry

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 59% | 46% | 53% |
| 2 weeks | 43% | 30% | 39% |
| 1 month | 31% | 19% | 28% |
| 3 months | 14% | 7% | 14% |
| 6 months | 6% | 3% | 8% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 2% |



### 4.1.4 Injury type

Overall, within strain injuries, the average work disability days paid per claim was less for non-back strain injuries (BC: 39.9; MB: 32.5; ON: 33.1) than for back strain injuries (BC: 29.1; MB: 27.2; ON: 28.0) (Figure 5).

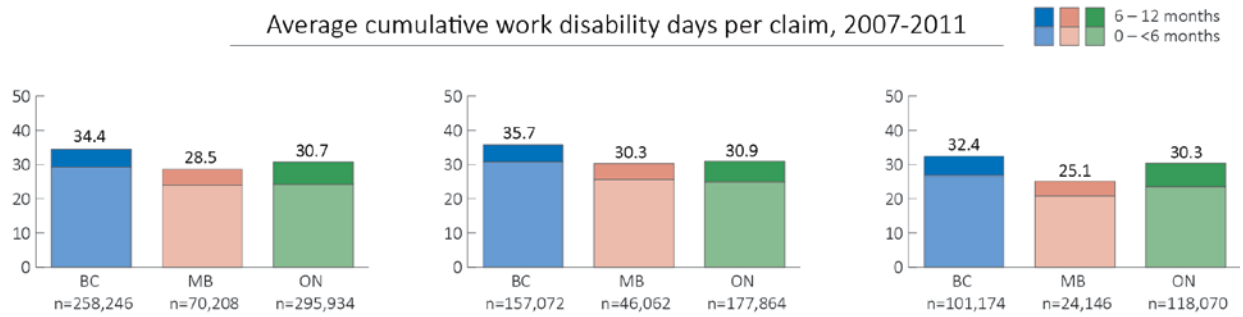
- Within non-strain injuries, fractures had markedly longer work disability durations (BC: 80.7; MB: 62.2; ON: 65.9) than concussions and other non-strain injuries.[16] Following a fracture injury, 92%, 87%, and 83% of claims were receiving work disability benefits after one week in BC, MB, and ON, respectively (Figure 5f).
- Within health care by detailed injury type, lower durations in ON persisted in comparison to BC and MB (Figure 6).
- In construction for fracture injuries, the differences between ON and BC converged in comparison to the overall injuries, whereas MB remained markedly lower (Figure 7).
- In manufacturing, similar patterns occurred within strain injuries. However, on average, 12.4 more work disability days were paid for fracture injuries in BC compared to ON (Figure 8).

[16] Data not presented here. See Table 7 of the 'Methods and Results Appendix'.

# Figure 5 All industries, by injury type

## 5a All injuries

Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 69% | 61% | 55% |
| 2 weeks | 52% | 44% | 39% |
| 1 month | 38% | 31% | 28% |
| 3 months | 16% | 13% | 14% |
| 6 months | 7% | 6% | 8% |
| 9 months | 4% | 3% | 5% |
| 12 months | 0% | 1% | 2% |

## 5b Strain injuries

Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 73% | 66% | 58% |
| 2 weeks | 56% | 48% | 41% |
| 1 month | 41% | 33% | 29% |
| 3 months | 17% | 13% | 14% |
| 6 months | 7% | 6% | 8% |
| 9 months | 4% | 4% | 5% |
| 12 months | 0% | 1% | 2% |

## 5c Non-strain injuries

Average cumulative work disability days per claim, 2007-2011

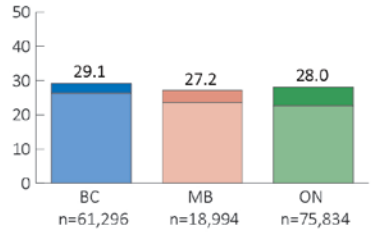



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 61% | 52% | 51% |
| 2 weeks | 44% | 37% | 37% |
| 1 month | 32% | 26% | 27% |
| 3 months | 16% | 11% | 14% |
| 6 months | 7% | 5% | 8% |
| 9 months | 4% | 3% | 5% |
| 12 months | 0% | 1% | 2% |

## 5d Back strain injuries

Average cumulative work disability days per claim, 2007-2011

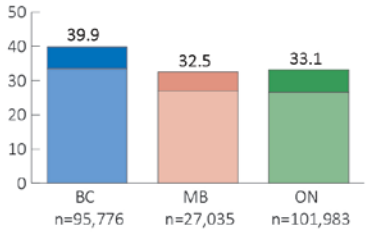



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 73% | 67% | 58% |
| 2 weeks | 54% | 48% | 39% |
| 1 month | 38% | 31% | 26% |
| 3 months | 12% | 11% | 12% |
| 6 months | 4% | 5% | 7% |
| 9 months | 2% | 3% | 4% |
| 12 months | 0% | 1% | 1% |

## 5e Non-back strain injuries

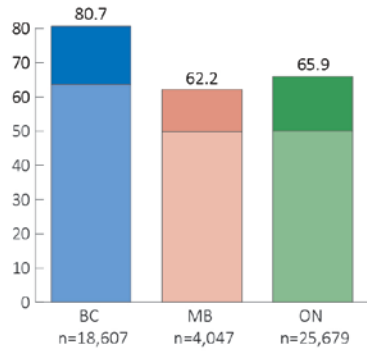
Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 65% | 58% |
| 2 weeks | 57% | 48% | 43% |
| 1 month | 43% | 34% | 31% |
| 3 months | 19% | 15% | 16% |
| 6 months | 9% | 7% | 8% |
| 9 months | 5% | 4% | 5% |
| 12 months | 0% | 1% | 1% |

## 5f Fractures



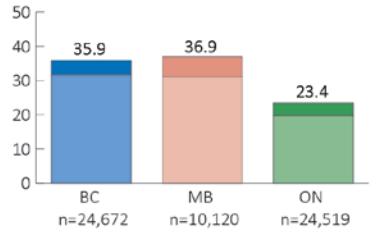

% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 92% | 87% | 83% |
| 2 weeks | 86% | 78% | 73% |
| 1 month | 77% | 65% | 61% |
| 3 months | 44% | 32% | 33% |
| 6 months | 22% | 15% | 18% |
| 9 months | 13% | 9% | 12% |
| 12 months | 1% | 4% | 5% |

# Figure 6 Health care industry, by injury type

## 6a All injuries

Average cumulative work disability days per claim, 2007-2011

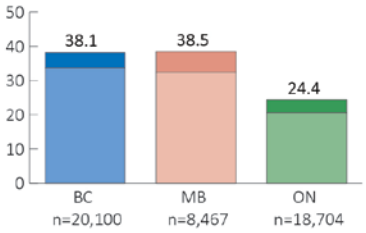



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 68% | 50% |
| 2 weeks | 59% | 53% | 35% |
| 1 month | 46% | 40% | 24% |
| 3 months | 16% | 18% | 10% |
| 6 months | 6% | 8% | 5% |
| 9 months | 3% | 5% | 3% |
| 12 months | 0% | 1% | 1% |

## 6b Strain injuries

Average cumulative work disability days per claim, 2007-2011

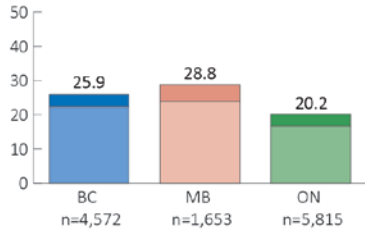



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 79% | 71% | 53% |
| 2 weeks | 63% | 56% | 36% |
| 1 month | 50% | 42% | 25% |
| 3 months | 17% | 19% | 11% |
| 6 months | 6% | 8% | 5% |
| 9 months | 3% | 5% | 3% |
| 12 months | 0% | 1% | 1% |

## 6c Non-strain injuries

Average cumulative work disability days per claim, 2007-2011

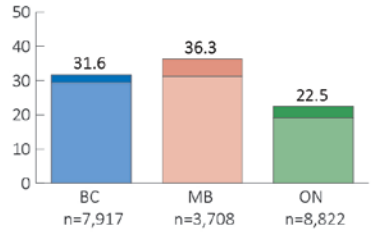



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 56% | 54% | 43% |
| 2 weeks | 39% | 40% | 29% |
| 1 month | 28% | 30% | 20% |
| 3 months | 12% | 14% | 9% |
| 6 months | 5% | 6% | 4% |
| 9 months | 3% | 4% | 3% |
| 12 months | 0% | 1% | 1% |

## 6d Back strain injuries

Average cumulative work disability days per claim, 2007-2011

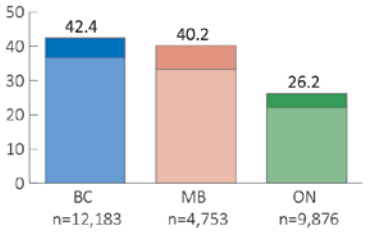



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 78% | 72% | 53% |
| 2 weeks | 61% | 56% | 35% |
| 1 month | 47% | 42% | 23% |
| 3 months | 13% | 17% | 10% |
| 6 months | 4% | 7% | 5% |
| 9 months | 1% | 4% | 3% |
| 12 months | 0% | 1% | 1% |

## 6e Non-back strain injuries

Average cumulative work disability days per claim, 2007-2011

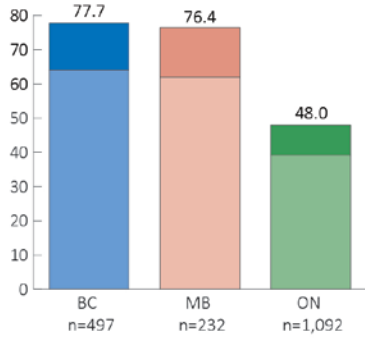



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 79% | 70% | 53% |
| 2 weeks | 65% | 55% | 37% |
| 1 month | 52% | 42% | 27% |
| 3 months | 20% | 20% | 12% |
| 6 months | 8% | 9% | 6% |
| 9 months | 4% | 5% | 3% |
| 12 months | 0% | 1% | 1% |

## 6f Fractures

Average cumulative work disability days per claim, 2007-2011



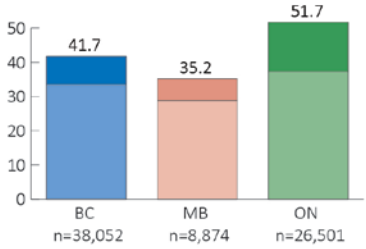

% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 92% | 92% | 77% |
| 2 weeks | 89% | 88% | 66% |
| 1 month | 80% | 78% | 52% |
| 3 months | 45% | 44% | 24% |
| 6 months | 21% | 18% | 10% |
| 9 months | 11% | 11% | 6% |
| 12 months | 1% | 4% | 3% |

# Figure 7 Construction industry, by injury type

## 7a All injuries

Average cumulative work disability days per claim, 2007-2011

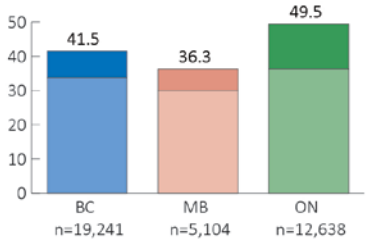



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 69% | 67% | 65% |
| 2 weeks | 53% | 50% | 51% |
| 1 month | 40% | 36% | 41% |
| 3 months | 20% | 16% | 24% |
| 6 months | 10% | 8% | 16% |
| 9 months | 6% | 5% | 11% |
| 12 months | 1% | 2% | 4% |

## 7b Strain injuries

Average cumulative work disability days per claim, 2007-2011

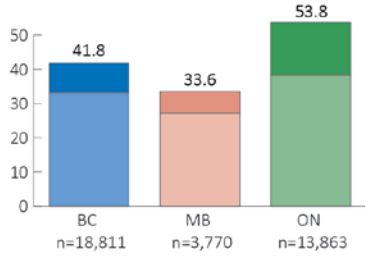



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 73% | 65% |
| 2 weeks | 57% | 54% | 49% |
| 1 month | 41% | 38% | 39% |
| 3 months | 20% | 17% | 24% |
| 6 months | 10% | 8% | 15% |
| 9 months | 6% | 5% | 10% |
| 12 months | 1% | 1% | 3% |

## 7c Non-strain injuries

Average cumulative work disability days per claim, 2007-2011

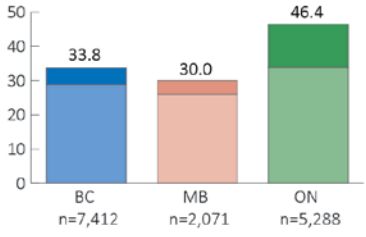



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 64% | 60% | 65% |
| 2 weeks | 49% | 45% | 52% |
| 1 month | 38% | 34% | 42% |
| 3 months | 21% | 15% | 25% |
| 6 months | 11% | 8% | 16% |
| 9 months | 7% | 5% | 12% |
| 12 months | 1% | 2% | 5% |

## 7d Back strain injuries

Average cumulative work disability days per claim, 2007-2011

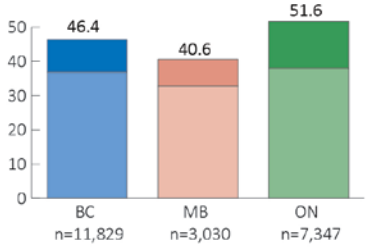



% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 75% | 64% |
| 2 weeks | 55% | 53% | 46% |
| 1 month | 38% | 34% | 36% |
| 3 months | 15% | 13% | 22% |
| 6 months | 7% | 6% | 14% |
| 9 months | 4% | 3% | 10% |
| 12 months | 0% | 1% | 3% |

## 7e Non-back strain injuries

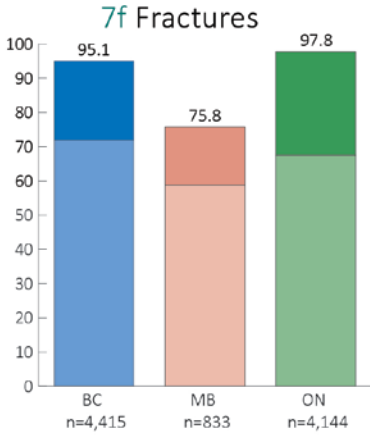
Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 74% | 71% | 66% |
| 2 weeks | 58% | 55% | 52% |
| 1 month | 44% | 40% | 41% |
| 3 months | 23% | 19% | 25% |
| 6 months | 12% | 10% | 16% |
| 9 months | 7% | 6% | 10% |
| 12 months | 1% | 2% | 3% |

## 7f Fractures




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 94% | 91% | 89% |
| 2 weeks | 89% | 86% | 83% |
| 1 month | 82% | 76% | 75% |
| 3 months | 52% | 38% | 47% |
| 6 months | 28% | 21% | 31% |
| 9 months | 18% | 13% | 23% |
| 12 months | 2% | 6% | 11% |

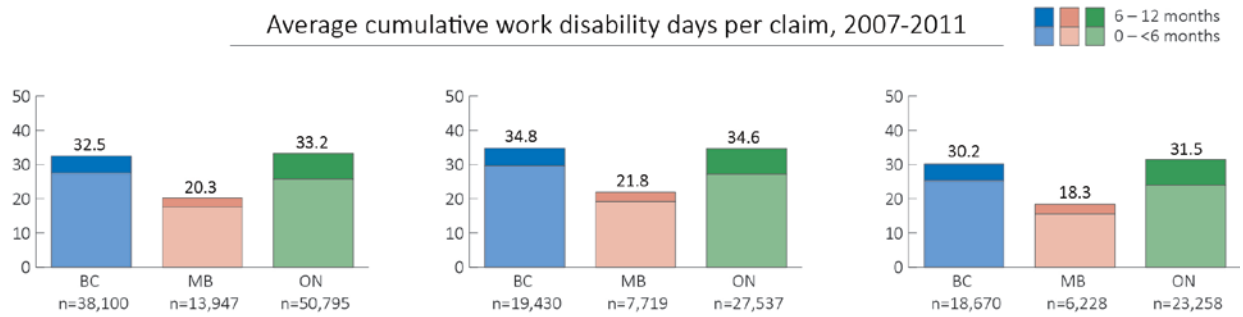
# Figure 8 Manufacturing industry, by injury type

## 8a All injuries

## 8b Strain injuries

## 8c Non-strain injuries

Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 65% | 53% | 56% |
| 2 weeks | 48% | 36% | 41% |
| 1 month | 35% | 23% | 29% |
| 3 months | 15% | 8% | 15% |
| 6 months | 7% | 4% | 9% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 2% |

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 71% | 59% | 58% |
| 2 weeks | 53% | 40% | 42% |
| 1 month | 39% | 25% | 30% |
| 3 months | 16% | 9% | 16% |
| 6 months | 7% | 4% | 9% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 1% |

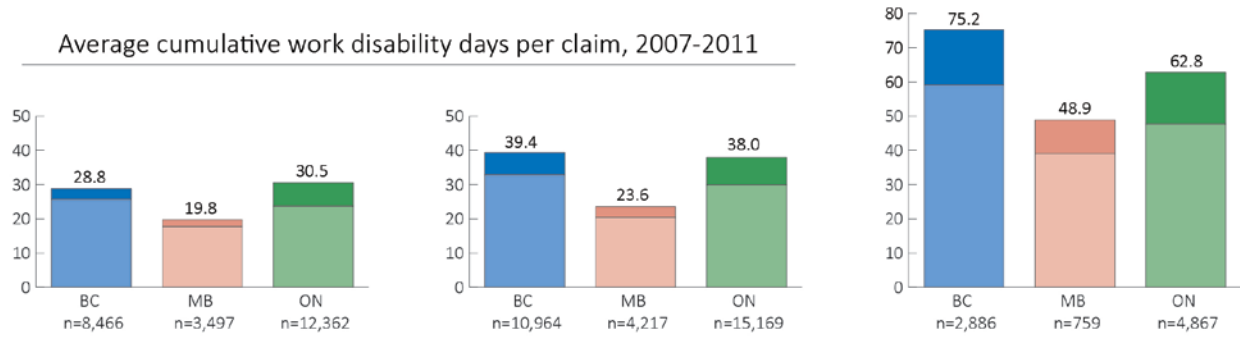
| | BC | MB | ON |
|---|---|---|---|
| 1 week | 59% | 46% | 53% |
| 2 weeks | 43% | 30% | 39% |
| 1 month | 31% | 19% | 28% |
| 3 months | 14% | 7% | 14% |
| 6 months | 6% | 3% | 8% |
| 9 months | 4% | 2% | 6% |
| 12 months | 0% | 1% | 2% |

## 8d Back strain injuries

## 8e Non-back strain injuries

## 8f Fractures

Average cumulative work disability days per claim, 2007-2011




% on claim at work disability thresholds, 2007-2011

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 71% | 61% | 56% |
| 2 weeks | 51% | 40% | 38% |
| 1 month | 36% | 24% | 26% |
| 3 months | 12% | 7% | 14% |
| 6 months | 5% | 3% | 8% |
| 9 months | 2% | 2% | 5% |
| 12 months | 0% | 1% | 1% |

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 71% | 57% | 59% |
| 2 weeks | 55% | 41% | 46% |
| 1 month | 41% | 27% | 34% |
| 3 months | 19% | 10% | 18% |
| 6 months | 9% | 5% | 10% |
| 9 months | 5% | 2% | 6% |
| 12 months | 0% | 1% | 1% |

| | BC | MB | ON |
|---|---|---|---|
| 1 week | 90% | 81% | 82% |
| 2 weeks | 83% | 69% | 71% |
| 1 month | 73% | 53% | 58% |
| 3 months | 40% | 23% | 31% |
| 6 months | 20% | 11% | 17% |
| 9 months | 12% | 7% | 11% |
| 12 months | 1% | 4% | 5% |

### 4.1.5 Industry and Occupation

Looking at the data by industry and occupation:

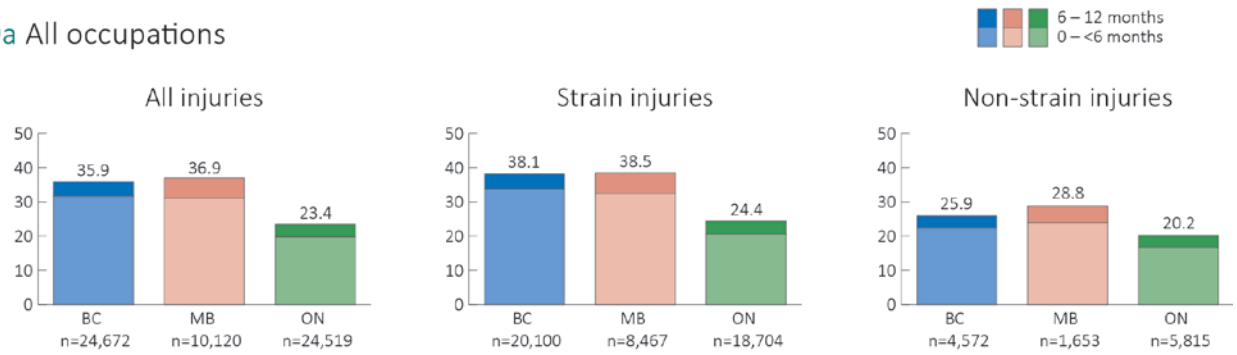
- In health care, BC and MB continued to have more work disability days paid than ON across all occupations and injury types (BC: 35.9; MB: 36.9 ON: 23.4) (Figure 9). The differences across health care occupations was greatest for strain injuries than for non-strain injuries. The largest differences between BC, MB and ON were among registered nurses with strain injuries (MB and BC paid 19.8 and days more than ON). Strain injuries in licensed practical nurses and other technical occupations (BC: 37.1; MB: 40.2; ON: 23.4) and nurse aides, orderlies, and other assisting occupations (BC: 39.0; MB: 38.2; ON: 25.3) had the highest number of work disability days paid across all three provinces.
- In construction, ON continued paying more work disability days than BC and MB, regardless of occupation or injury type. Heavy equipment operators with non-strain injuries presented the largest differences between with ON having 27.8 more disability days than BC and 32.4 more than MB (Figure 10). Durations for non-strain injuries across construction occupations were driven by fracture injury durations in comparison to concussion and other non-strain injuries.[17]
- In manufacturing, BC and ON consistently had more work disability days paid than MB, across all occupations and injuries. Machine operators had the highest number of work disability days paid across all injury groups, particularly strain injuries (BC: 34.2; MB: 23.7; ON: 36.1) (Figure 11). Average days paid decreased for assemblers and remained the same for labourers (Figure 11c). A similar number of strain injury and non-strain injury claims occurred within the selected manufacturing occupations, with strain injuries resulting in longer durations.

[17] See Table 12 in the 'Methods and Results Appendix'.

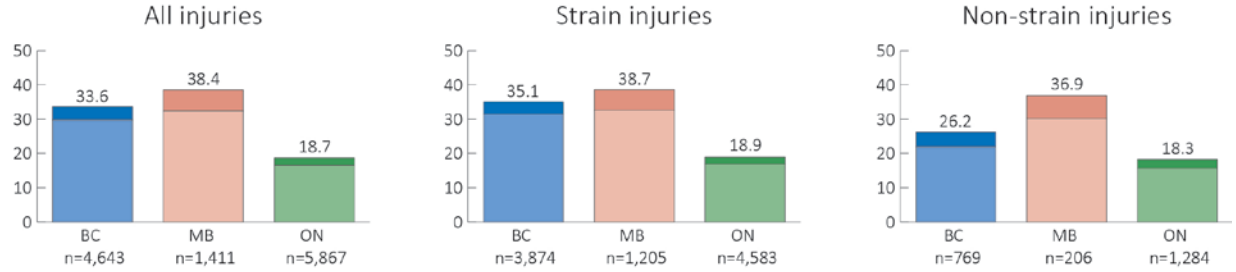
# Figure 9 Health care industry, by occupation and injury type

Average cumulative work disability days per claim, 2007-2011

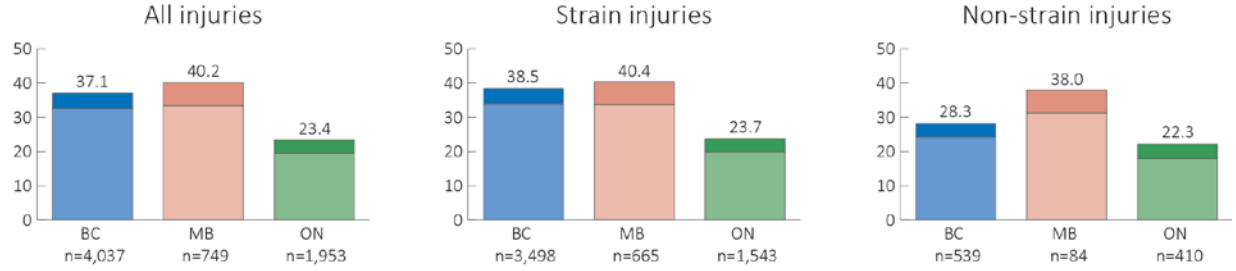
## 9a All occupations



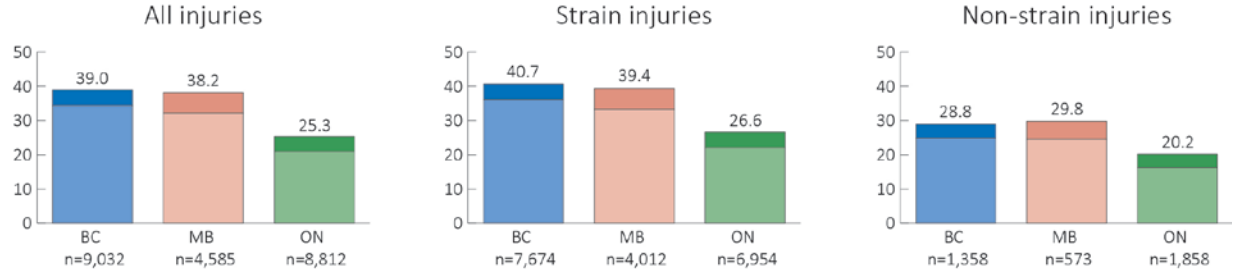

## 9b Registered nurses




## 9c Licensed practical nurses and other technical occupations

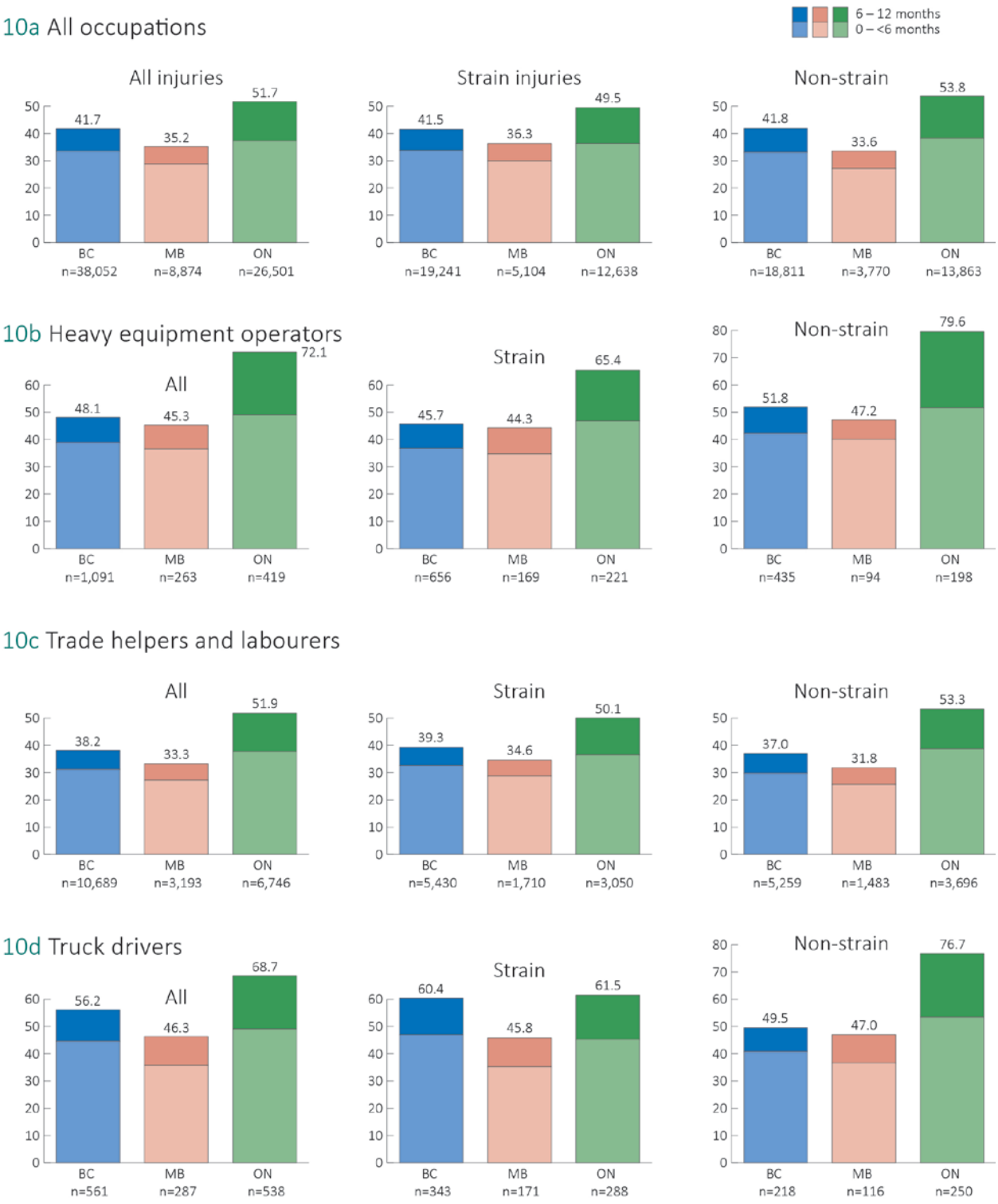



## 9d Nurse aides, orderlies, and other assisting occupations



# Figure 10 Construction industry, by occupation and injury type

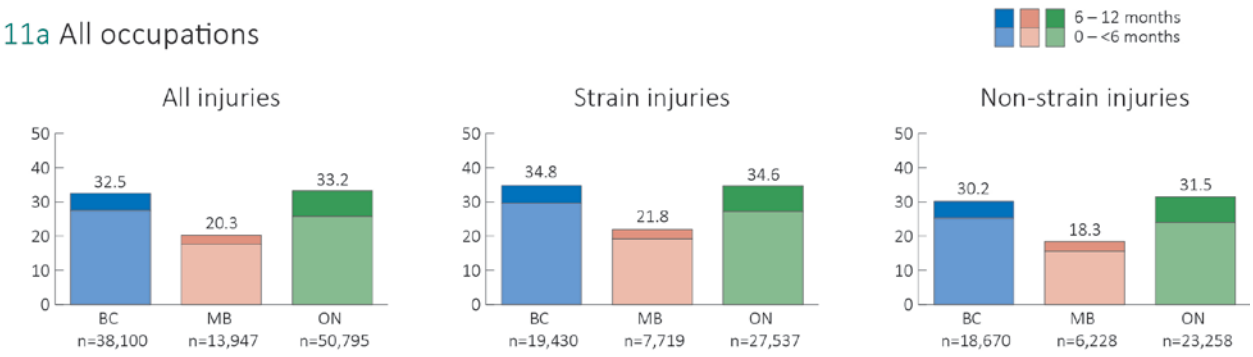
Average cumulative work disability days per claim, 2007-2011



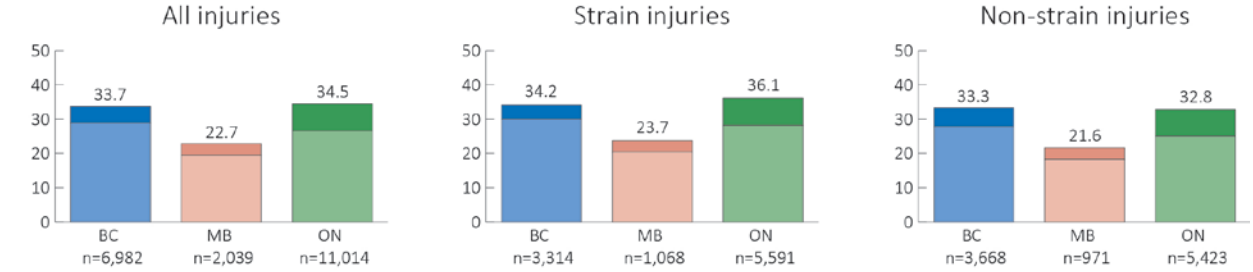
# Figure 11 Manufacturing industry, by occupation and injury type

Average cumulative work disability days per claim, 2007-2011

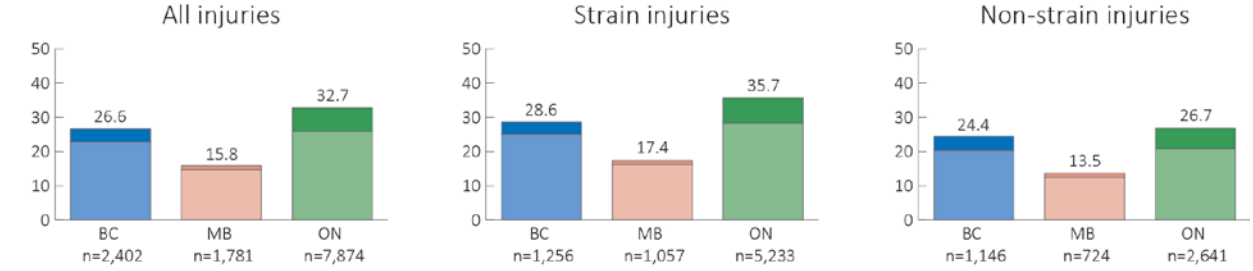
## 11a All occupations



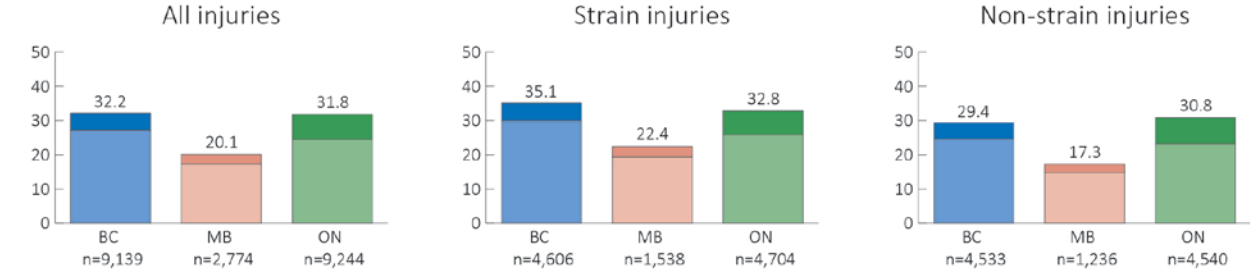

## 11b Machine operators




## 11c Mechanical, electrical and other assemblers




## 11d Labourers



## 4.2 Gender Results

### 4.2.1 Inter-jurisdictional differences in work disability duration by gender

The effects of gender by province on work disability duration were examined using Cox proportional hazard models (Table 3).[18] The HR of 0.88 tells us that BC women were less likely to transition off work disability benefits than BC men for all injuries. As the 95% CI did not overlap with 1, the result is considered to be statistically significant at the 95% CI level. Another way to interpret this relative difference is to convert it into a percentage difference by subtracting the 1 from HR and multiplying it by 100 (i.e., (HR – 1)*100), which tells us that the hazard of BC women transitioning off work disability benefits was 13% lower than BC men. A similar result was observed for MB women with an HR of 0.93 or 7% lower.

Three main findings of the gender analysis were:

1. Women were less likely to transition off work disability benefits than men in both BC and MB.
2. ON women were more likely to transition off work disability benefits than ON men (except for strain and back strain injuries).
3. The largest differences between men and women occurred within strain and back strain injuries.

However, as noted in section 5.2 of the 'Methods and Results Appendix', these pooled inter-provincial models violated the Cox proportional hazards assumption and, therefore, only provide a weighted average of the HR across the 1-year follow-up for each province by gender differences. In order to obtain more precise estimates of these gender differences, we also stratified our models by province and then used piecewise models to estimate the HR of gender for different time intervals (Figures 12).

[18] Full models are shown in Table 16 of the 'Methods and Results Appendix'.

Table 3 Likelihood of claims transitioning off work disability benefits for province by gender, by injury type

| | All injuries (615,773) | | Strain injuries (376,319) | | Back strain (154,020) | | Non-back strain (222,299) | |
|---|---|---|---|---|---|---|---|---|
| | HR | 95% CI | HR | 95% CI | HR | 95% CI | HR | 95% CI |
| BC women | 0.879*** | (0.871, 0.888) | 0.858*** | (0.848, 0.869) | 0.825*** | (0.809, 0.841) | 0.880*** | (0.866, 0.893) |
| MB men | 1.116*** | (1.104, 1.127) | 1.132*** | (1.117, 1.147) | 1.109*** | (1.086, 1.131) | 1.148*** | (1.128, 1.169) |
| MB women | 0.925*** | (0.911, 0.939) | 0.920*** | (0.904, 0.937) | 0.835*** | (0.811, 0.859) | 0.981 | (0.959, 1.004) |
| ON men | 1.060*** | (1.053, 1.067) | 1.105*** | (1.095, 1.115) | 1.095*** | (1.080, 1.110) | 1.116*** | (1.102, 1.129) |
| ON women | 1.090*** | (1.080, 1.099) | 1.082*** | (1.070, 1.095) | 1.032*** | (1.014, 1.051) | 1.118*** | (1.102, 1.135) |

| | Non-strain (239,424) | | Fracture (47,615) | | Concussion (10,386) | | Other (181,423) | |
|---|---|---|---|---|---|---|---|---|
| | HR | 95% CI | HR | 95% CI | HR | 95% CI | HR | 95% CI |
| BC women | 0.930*** | (0.915, 0.944) | 0.895*** | (0.860, 0.930) | 0.949 | (0.892, 1.009) | 0.938*** | (0.921, 0.955) |
| MB men | 1.092*** | (1.074, 1.110) | 1.178*** | (1.131, 1.226) | 1.195** | (1.058, 1.349) | 1.086*** | (1.066, 1.106) |
| MB women | 0.946*** | (0.921, 0.973) | 0.977 | (0.910, 1.049) | 1.072 | (0.907, 1.267) | 0.954** | (0.926, 0.984) |
| ON men | 1.010 | (1.000, 1.021) | 1.021 | (0.997, 1.045) | 0.984 | (0.929, 1.042) | 1.035*** | (1.022, 1.047) |
| ON women | 1.108*** | (1.092, 1.124) | 1.111*** | (1.074, 1.149) | 1.009 | (0.943, 1.081) | 1.140*** | (1.121, 1.159) |

Notes: Reference category in each model is BC men. HR indicates Hazard Ratio. 95% CI indicates 95% confidence interval. *P<0.05; **P<0.01; ***P<0.001. All models fully adjusted for age, three-digit occupation, injury type (where appropriate), and injury year.

### 4.2.2 Intra-jurisdictional differences in work disability duration by gender

The HRs for the piecewise models are presented in Figure 12.[19] These results require a careful interpretation than the results in Table 3 because the HRs are being estimated at different periods over the length of a claim. In the leftmost graph of Figure 12a (all industries, all occupations), we see that between 0 and 19 days of receiving work disability benefits, the difference between men and women was greatest in BC. The likelihood of women in BC transitioning off work disability benefits was 14% less than men and it was 10% less in MB. In contrast, the difference between ON men and women between 0 and 19 days was the smallest of all three provinces. ON women were 3% less likely than men to transition of work disability benefits. When looking at claims receiving work disability benefits between 20-64 days (1-<3 months), BC women were 5% more likely to transition of work disability benefits than BC men. In contrast, during the same period, women in MB and ON were 12% and 6% less likely to transition off benefits than men. Between 65 and 129 days (3-6 months), women in BC and MB were 8% and 9% more likely to transition of work disability benefits than men. Between 130 and 260 (6-12 months), women in MB and ON were 11% and 7% more likely to transition off work disability benefits than men.

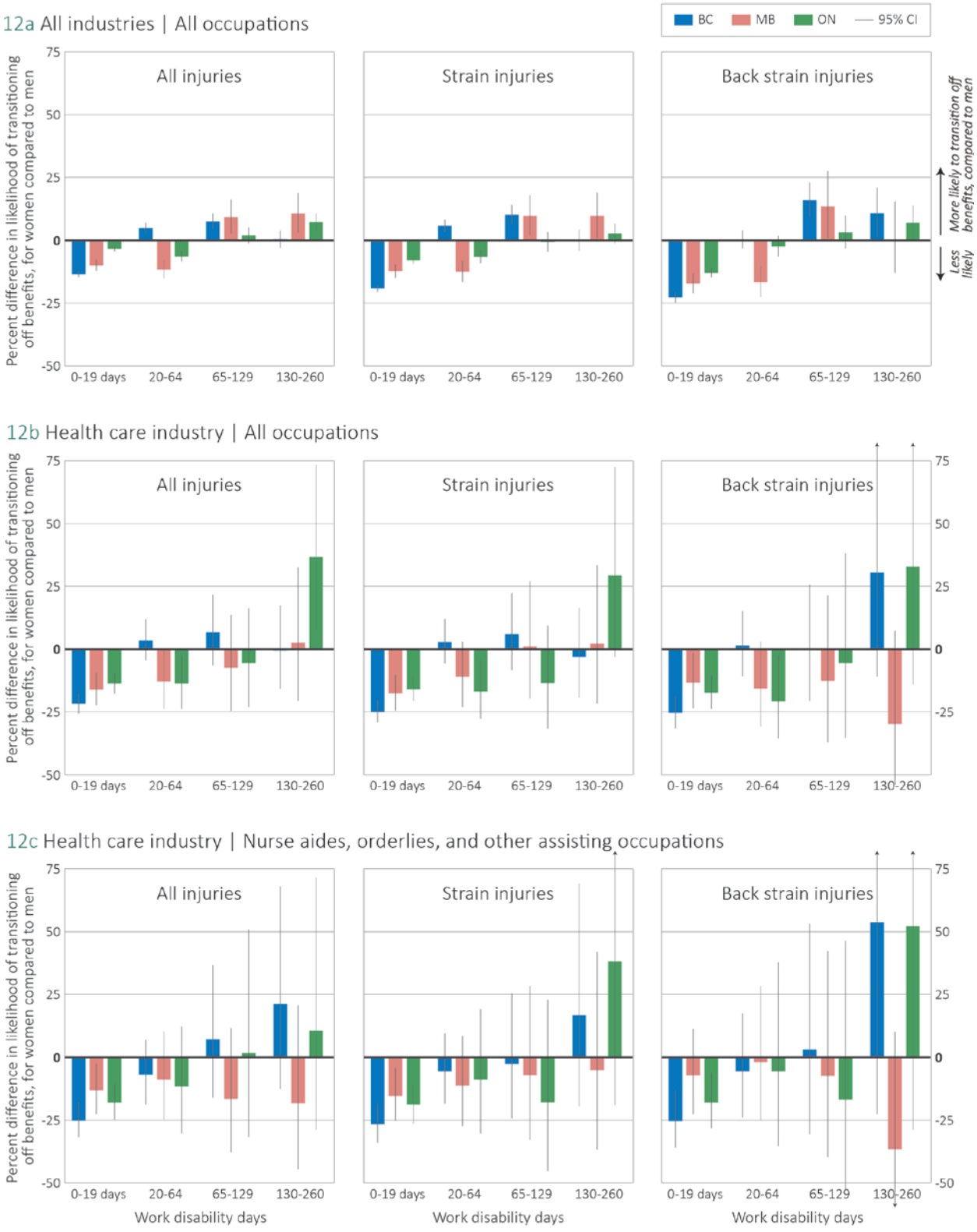
[19] Full results of Figure 12 (including *N*, hazard ratios and 95% CI) are shown in Table 17, 18, and 19 of the 'Methods and Results Appendix'. The HRs are converted to represent a percentage likelihood between women and men in transitioning off work disability benefits within each time period.

By examining HRs at differing claim durations, three things become evident.

1. Over time, the likelihood of women transitioning off work disability benefits, in relation to men, changed from being slower in the initial 0-19 days, to being no different or faster at longer claim durations.
2. The province in which the gender differences were greatest depended on the claim duration and the occupation and injury type. The largest differences observed in BC were between 0-19 days for all comparisons and it was only in this period that men transitioned off claim faster than women. In MB and ON, men tended to transition off claim faster than women for both the 0-19 day period and the 20-64 day period. There was no consistent pattern at longer claim durations as in all provinces it depended on the particular comparison as to whether there was no difference between men and women or whether men transition off claim slower.
3. The precision in the model estimates was weaker for longer claim duration because of fewer number of people still on benefits (evident by the widening of CIs).

Additional comparisons were made for select occupational groupings (see shown in Tables 20, 21, and 22 of the 'Methods and Results Appendix'). However, the results from these comparisons are omitted from the main report due to small sample sizes which resulted in imprecise model estimations.

Figure 12 The relative effect of gender on transitioning off benefits by work disability duration, by industry and occupation



To better illustrate changing proportion of claims in receipt of disability benefits over time, Table 4 presents the predicted survival based on the piecewise hazard model estimates from Figure 12a. The survival represents the proportion of claims still in receipt of disability benefits at a given time and is standardized to 1,000 claims for selected occupations. For example, of 1,000 claims (of any injury or occupation type) in receipt of disability benefits, 903 men and 915 women are still receiving disability benefits after 1 day in BC. By 20 days, the number of men and women still receiving disability benefits has decreased to 368 and 421, respectively. By 65 days, there were more men (153) than women (139) still receiving disability benefits. At one year (260 days), only 1 of 1,000 men was still receiving disability benefits and 1 of 1,000 women.

An example of where the time-varying effect of gender changes over time is for janitors, caretakers and building superintendents in MB. At day 1, there were 27 more women (896) than men (869) still receiving benefits. At 20 days, there were as many as 90 more women still receiving benefits (405 women vs. 314 men). However, by 65 days there were 10 less women receiving benefits than men (34 women vs. 61 men). This difference grew to 27 less women at 130 days.

In contrast, the findings for nurse aides in MB show that in relation to men, there were consistently more women still receiving benefits at all six of the time points.

Table 4 Predicted survival estimates of work disability duration by gender and province for selected occupation groups

| | | BC | | MB | | ON | |
|---|---|---|---|---|---|---|---|
| | Day | Men | Women | Men | Women | Men | Women |
| All injuries in all occupations | 1 | 903 | 915 | 884 | 895 | 834 | 839 |
| | 20 | 368 | 421 | 293 | 332 | 278 | 291 |
| | 65 | 153 | 139 | 111 | 143 | 129 | 148 |
| | 130 | 63 | 51 | 50 | 38 | 67 | 63 |
| | 195 | 31 | 31 | 27 | 19 | 41 | 33 |
| | 260 | 1 | 1 | 6 | 4 | 3 | 2 |

| | | BC | | MB | | ON | |
|---|---|---|---|---|---|---|---|
| | Day | Men | Women | Men | Women | Men | Women |
| All injuries for nurse aides in health care | 1 | 919 | 939 | 900 | 913 | 777 | 813 |
| | 20 | 408 | 512 | 380 | 432 | 182 | 247 |
| | 65 | 132 | 151 | 151 | 179 | 75 | 101 |
| | 130 | 50 | 40 | 55 | 89 | 36 | 34 |
| | 195 | 29 | 14 | 27 | 53 | 21 | 14 |
| | 260 | 4 | 1 | 3 | 8 | 2 | 1 |

| | | BC | | MB | | ON | |
|---|---|---|---|---|---|---|---|
| | Day | Men | Women | Men | Women | Men | Women |
| All injuries for janitors, caretakers and building superintendents | 1 | 920 | 933 | 869 | 896 | 842 | 857 |
| | 20 | 397 | 426 | 314 | 405 | 259 | 300 |
| | 65 | 166 | 188 | 126 | 116 | 113 | 106 |
| | 130 | 72 | 60 | 61 | 34 | 54 | 40 |
| | 195 | 33 | 30 | 38 | 13 | 34 | 18 |
| | 260 | 1 | 1 | 11 | 2 | 4 | 1 |

# 5 Discussion

## 5.1 Main findings

A key objective of this project was to investigate trends and variations in work disability duration across three provinces with the goal of identifying intra- and inter-jurisdictional drivers. The main findings from the comparative analysis are the following:

- Large differences in the average number of work disability days paid were observed across province and industry sector. Results indicate that jurisdiction has a marked effect on duration of work disability and this may be related to differences in work disability policy and practice.
- In the health care industry, observed differences in average work disability days paid across provinces are primarily driven by strain injuries.
- In the construction industry, observed differences in average work disability days paid across provinces are primarily driven by non-strain injuries, notably fractures.
- On average, men transitioned off claim faster than women across all provinces and the differences were largest in MB and smallest in ON. Men transitioned off claim faster during the first 19 days and there was either no difference or women transitioned off claim faster after 130 days.

### 5.1.1 Key drivers of inter-jurisdictional differences

Inter-provincial differences in work disability duration appear to be driven by industrial sector, rather than occupation. During the period of this study (2007 to 2011), no province consistently had the fewest or most number of disability days paid across all industries and occupations examined. MB paid out the most disability days on average in the health care sector, while ON paid out the most disability days in construction and manufacturing. In contrast, ON paid out the fewest disability days in health care and MB paid out the fewest in construction and manufacturing. BC paid on average most disability days overall, but in specific industry and occupation comparisons was almost always the middle-ranked jurisdiction (e.g., in construction BC paid out more disability days than MB, but fewer than ON). The finding of a strong province/industry/occupation effect in the differences in disability days demonstrates the importance of using detailed claims-level data for conducting cross-jurisdictional studies as the industrial/occupational mix across jurisdictions can vary considerably. Moreover, that these patterns persisted regardless of more detailed analyses by occupation and injury, suggests that these differences are determined at the industry level within province.

Within the industry/occupation comparisons, we found a large effect by injury type. In the health care industry, strain injuries account for most injuries and the difference in disability days paid by jurisdiction is larger for strain injuries and smaller for non-strain injuries. In contrast, there were similar proportions of strain and non-

strain injuries in construction and the jurisdictional differences tended to be larger among non-strain injuries, particularly for fractures. This suggests that while the conditions of work injury may be similar across provinces by industry and occupation, the approaches to RTW may vary. This finding is indicative of inter-jurisdictional differences in policy and practice, but more research is needed to understand how and why similar RTW policies and practices within jurisdictions lead to a different ranking of disability days paid by industry across jurisdictions.

While our findings are largely descriptive, they are not likely to be explained by demographic differences in the workforce (such as age and gender) as these differences are small across these three provinces. Other international studies looking at sub-national differences in disability outcomes have also found a large jurisdiction effect. Recent evidence using similar claims-level administrative data in Australia found that the state or territory in which a work-related compensation claim was lodged had a large effect on work disability duration, even after adjusting for key confounders (Collie et al. 2016). A comparative study of RTW in six Danish municipalities found a significant effect of municipality on work disability that changed over by length of follow-up (Stoltenberg & Skov 2010). The authors stated that this might have been caused by organizational factors such as different workplace practices or case management procedures. A similar study in Sweden also found municipal variation in work disability duration and that the variation was related to factors such as population density, unemployment level, and average income per municipality (Dellve et al. 2006).

### 5.1.2 Trends over time

Our study found differences and similarities in trends in disability duration by time across these three provinces. The time trends in disability days paid tended to be stable in MB and increased in BC and decreased in ON. Increases and decreases in time trends were larger for strain injuries compared to non-strain injuries. We examined whether these diverging trends could be explained by factors external to the compensation system. During our study period, Canada experienced the second deepest recession in its history (the Great Depression of the 1930s being the first). Monthly unemployment rates in ON and BC increased from 6.2% and 4.2% in early 2008 to a high of 9.6% and 8.3% in 2009, respectively. The increase in the unemployment rate was more modest in MB. Moreover, the decline in number of lost time compensation claims during this period was greatest in BC and ON compared to MB.

Other research has found that return to work is more difficult during a recession as injured workers may find that they have no job to return to and employers may be less able to offer modified work (Mustard & Petch 2012) (Fortin et al. 1996). Our results find mixed support for the 2008/2009 recession as an explanation for the observed time tends in disability duration. The upward trend in disability duration in BC is consistent with a recession effect, but the downward trend in ON is not. This is especially pertinent in construction, one of the

industries most affected by the recession. The stable trend line in disability duration in MB is consistent with a milder effect of the recession in this province.

In addition to macroeconomic and labour market effects, changes to jurisdictional policy and practice may explain some of the differences in the disability duration time trends. We conducted a review of policy documentation and WCB websites and spoke with workers' compensation stakeholders to identify other reasons for these divergent time trends. Several policy and practice changes to the adjudication and management of claims in BC and ON were identified. For example, in 2009, the WSIB introduced technology-enabled adjudication of no-lost-time claims (Workplace Safety and Insurance Board 2009) and, within 1 year, 17% of claims were adjudicated using this method (Workplace Safety and Insurance Board 2010). Around the same time, the WSIB put a greater emphasis on earlier contact with injured workers who experienced lost time and implemented new practices around work reintegration. In contrast, during 2009, WorkSafeBC introduced a new Claims Management Solutions (CMS) electronic adjudication system (Rothfels 2009; WorkSafeBC 2009) which may have reduced injured worker or employer interaction with a claims adjudicator early on in the claims process. The implementation of CMS may have resulted in longer claim durations because some injured workers may have had to wait longer before corresponding directly with a claims manager. Conversely, many short-duration claims are adjudicated and completed without direct case manager involvement and it is not clear how this would impact claim duration. Notably, we did not identify any large changes in RTW practice or policy in MB during the study period. Given that our study ends in 2011, we cannot rule out that the increase in the average disability duration in BC after 2009 was confounded by the greater impact of the recession in BC on claim rates. Moreover, the time period examined in this study (2007-2011) reflected the initial implementation of the CMS process and may not reflect the impact of the system once fully implemented. Further research extending our analysis beyond 2011 is needed to disentangle the competing influences on claim duration.

Differences in the observed number of disability days by jurisdiction may also be explained by differences in legislation, policies and practices regarding: claim registration and adjudication, the duty of employers and workers to accommodate or mitigate effect of a lost time injury, what constitutes a lost-time injury, and the incentive effects of different experience rating programs. In both ON[20] and MB[21], the duty for employers to accommodate workers and to mitigate the consequences of work injury is legislated under their workers' compensation and human rights acts. In contrast, in BC, employers are not required to accommodate an injured under the *Workers' Compensation Act*. Rather, they are encouraged by policy to offer selective light or modified

[20] *Workplace Safety and Insurance Act, 1997* (section 41(6)) and the *Human Rights Act*.
[21] *Workers Compensation Act* (section 49.3) and the *Human Rights Act*.

duties. As a consequence, the WSIB and the WCB MB have a stronger legislative mandate than WorkSafeBC to enforce accommodation and reintegration of injured workers back in to the workforce.

Another factor that may have affected the disability days measure in ON relative to BC and MB is the Compensation Advances by Employer Policy. In certain cases, Schedule 1 employers may advance pay or provide other benefits during a period a worker is eligible to receive wage replacement compensation. If the amount paid by the employer is less than the compensation payable to the worker, the employer may elect to not receive reimbursement from the WSIB (Sobeco 2008; Ontario Nurses' Association 2013). In other cases, employers may have the opportunity to pay the employee directly during the RTW process and may not seek reimbursement from WSIB for the modified RTW benefits paid. In these cases, lost-time claims or disability payments paid to the injured worker by their employer are not counted as lost-time payments in ON, but would be included as lost-time claims or payments in other jurisdictions that do not have an advances by employer policy. This could reduce the number of lost-time claims and/or disability days paid in ON relative to other jurisdictions. The effect this has on average disability duration would depend on whether employer claims management practices have a greater impact on shorter versus longer duration claims (i.e., removing shorter duration claims would increase average claims duration, while shortening longer duration claims would do the converse). No empirical studies, to our knowledge, have specifically tested whether the Employer Advances Policy affects disability duration/RTW.

### 5.1.3 Gender differences in transitioning off work disability benefits

Gender is a key factor known to be associated with differences in disability outcomes but that is influenced by the social, labour market and workers' compensation contexts. Our findings support the following conclusions about the cross-jurisdictional effect of gender on work disability duration:

1. There were statistically significant gender differences in work disability duration in all three provinces. Women were less likely to transition off work disability benefits than men but typically for claims lasting less than 20 days.
2. There is evidence of effect modification. In other words, the effect of gender on work disability duration is modifiable by jurisdiction, with the effects appearing larger in BC and MB than in ON in the first 19 days.
3. There is evidence that the effect of gender on work disability duration varies by duration of claim. In almost of the analytical examples that we show, women were less likely to transition off work disability benefits than men during the first 19 days of a claim but no more likely to transition off work disability benefits the longer the duration of work disability. In some comparisons, at longer disability durations,

women were less likely to transition of work disability benefits, however these differences were only statistically significant in a few cases.

These findings point to a need for further research to investigate why there is a difference between men and women's work disability duration, why it differs across jurisdiction, and why it may differ for shorter and longer disability durations.

One possible explanation as to why we saw significant gender differences in work disability duration was that our data could not fully capture differences associated with the gendered role of occupation. For example, while we were able to examine gendered differences in disability days paid for janitors, caretakers and building superintendents at the 4-digit NOC level (NOC 2006: 6663), men and women may perform different tasks and/or work in different arrangements that affect the likelihood of RTW even at this fine grained occupational classification. Scandinavian research has also found gender differences in short-term and long-term work disability but that this may have been due to lack of adjustment in models for differing income and occupational structure between men and women (Blank & Diderichsen 1995; Brage et al. 1998).

Another explanation for women having different claim durations than men is unobserved characteristics, such as their domestic responsibilities. Over the past five decades, more women have entered the work force and are more likely to be a head of a single-parent household (Boden 2005). As such, women may find it more difficult to return to work before full recovery given their greater care and non-paid work responsibilities (i.e., informal work). Research in Quebec, Canada has found that having a dependent child had no effect on work disability duration for both men and women (Lederer et al. 2012), while other research has found an effect (Lederer & Rivard 2014).

The time-varying effect of gender on work disability duration may also be linked to the degree to which modified return to work was being offered to men and women. While modified return to work can significantly reduce work disability duration (Franche et al. 2005), research in ON found that gender was not a significant predictor in the offering and acceptance of work accommodation among claimants with musculoskeletal injuries (Franche et al. 2009). In contrast, research conducted by the UBC Partnership for Work, Health and Safety has found that injured women in BC are more likely to be offered modified duties than injured men (Koehoorn et al. 2016). Detailed information about modified work was not available in the data received and we cannot examine whether this finding in BC is similar in MB and ON.

The time-varying effect of gender on work disability duration is a unique result from this study. One of the reasons why we may be seeing this effect is that the models captured the effect of gender on less and more severe injuries. For less serious injuries, it may be that men return to work faster than women because workplace practices are more oriented to male workers. On the other hand, for serious injuries with a longer expected

duration, gender differences in the relationship between work and identity, as well as in the degree of social support, may play some role in long absences from work adversely affecting men more than women. Research in Spain found that unemployment has a greater on the mental health of men compared to women (Artazcoz et al. 2004). Moreover, men may be less like to receive a diagnosis and seek treatment for mental health disorders compared to women (Evans et al. 2011). Research from the Netherlands has shown that men are less likely to return to work with mental health complaints and long-term diseases than with musculoskeletal complaints (De Rijk et al. 2008). In Australia, mental health conditions have been associated with a greater number of days of work absence compared to musculoskeletal conditions (Smith et al. 2014). Research in Norway examining the likelihood of disability pension found that mental diagnoses resulted in greater odds of permanent disability among men than women (Gjesdal & Bratberg 2003). In summary, men and women may have different vulnerabilities or face different barriers that may vary across the disability duration distribution as well across jurisdiction. In order to more accurately model the complexity of changing hazards between men and women, future research will explore more complex statistical models, such as restricted cubic splines and fractional polynomials (Royston & Lambert 2011).

## 5.2 Strengths and Limitations

This study has several strengths. It is one of the first studies in Canada to conduct detailed analyses of work disability duration across jurisdictions. Access to record-level population-based workers' compensation data over a 10-year period enabled: (1) the detailed comparison of workers' compensation outcomes for specific industries, occupations, demographic groupings and across time; (2) the adjustment for differences in how compensation data are captured across these three provinces; and, (3) sensitivity testing to test the assumptions underlying these adjustments.

Notwithstanding these strengths, we cannot rule out that unaddressed issues in comparability and coverage account for some of the observed differences across jurisdictions and across time. We were not able to create comparable labour force denominators at the industry and occupation level for these three provinces due to the differences in workers' compensation coverage. Accordingly, we were not able to look at rates in severe injury and long-term claims per covered population. We focused, instead, on developing comparable cohorts of injured workers and examining differences in the number of disability days paid. Moreover, our measure of RTW – disability days paid – is an imperfect proxy for RTW that may mask differences in rates of and timing RTW across jurisdictions. Comparable data on end status of a claim (e.g. full RTW in same job and employer) would permit a more precise comparison.

Finally, the results of this study are largely descriptive. While we identified key differences in disability days paid across provinces that appeared to be related to policies and practices of the respective compensation boards, we were not able to explicitly test these relationships. As such, the findings of this study should be treated with caution and be seen as preliminary, but can motivate and guide further research to examine the effect of specific policies and practices on cross-jurisdictional outcomes.

# 6 Recommendations for Research

## 6.1 Improved standardization and availability of national workers' compensation data

One of the major contributions of this project is the creation of comparable cohorts of injured worker claims across multiple jurisdictions. Cross-jurisdictional reporting of workers' compensation statistics is limited in Canada, Currently, each jurisdiction provides the AWCBC with aggregate statistics in their Detailed Key Statistical Measures Report. However, the percentage of the covered workforce differs across these jurisdictions and comparing various compensation outcomes related to disability duration and RTW can be challenging. While claims and compensation data are collected for administrative purposes and reflect the structure and organization of respective compensation boards operations, how data are currently captured can often reflect historical data architectures and practices.

There is interest in implementing standardized approaches to collecting workers' compensation data across Canadian provinces[22] and current data systems and technologies make it more feasible to do so. The "*National Data Set for Compensation-based Statistics*" maintained by SafeWork Australia provides one such example. SafeWork Australia, a federal agency with the mandate to lead the development of policy to improve work health and safety and workers' compensation arrangements across Australia, collects and maintains a national standardized claims level dataset (Collie 2015). While there are still considerable differences in how respective Australian state compensation boards collect their data, the standardized national dataset has allowed comparative compensation research within Australia to include a greater number of states than we could do in this project (Collie, 2016).

## 6.2 Ongoing national and international monitoring of workers' compensation and RTW outcomes

This project has demonstrated the value of creating detailed comparisons of workers' compensation outcomes across Canadian provinces by industry, occupation, injury type and over time. The findings have prompted in-depth and insightful discussions on why we see differences in work disability outcomes. Expanding the descriptive analysis of comparable work disability outcomes to include more jurisdictions, years, and compensation indicators would provide a greater ability to examine future workers' compensation performance.

[22] For example, as part of a review of the Alberta WCB, a white paper was recently commissioned on the use of administrative data for prevention purposes. Harmonizing data across jurisdictions was one of the issues highlighted in the paper and discussed by a broad cross-section of stakeholders at a data symposium on January 25-26, 2017 in Edmonton.

Some of this will continue by the project PI through a Canadian Institutes of Health Research funded grant[23] and Workplace Safety & Insurance Board grant[24] that have aims to expand this research. In particular the ongoing research is developing detailed legislative and policy framework that will enable the examination of the impact of specific policies or practices on cross-jurisdictional differences. However, sustainable ongoing comparative analysis will require support and investment by Canadian compensation boards.

### 6.3 Investigation of key differences in RTW using mixed methods approaches.

This project has identified key differences in work disability outcomes across jurisdictions that may be explained by differences in jurisdictional legislation, policy and practice. Notably, we found a strong jurisdiction/industry effect and that the differences in yearly trends in average disability days paid could be attributable to policy and practice changes in claims administration or management. The noticeable cross-jurisdiction found in construction and health care differences are an area of future research in which improvements in work disability outcomes may be achieved.

Additional research using claims data may provide further insight, but administrative data can be limited in its ability to capture changes in policy and practices at the claims management and workplace level. Moreover, some key practices or outcomes may not be captured in administrative compensation data. For example, workplace practices that facilitate the injured workers staying at work may not be captured in claims or benefits data. Similarly, long-term RTW outcomes such as whether an injured worker remains employed or if they can return fully to pre-injury functioning and productivity are also not captured. Research that seeks to uncover detailed causal mechanisms that promote sustainable RTW will need to supplement administrative data with other data sources such as surveys of injured workers and employers, key informant interviews, and qualitative research.

[23] CIHR Operating Grant 'Return to work after work injury and illness: An international comparative effectiveness study of Canada, Australia and New Zealand', Application Number 326950.
[24] WSIB Grant 'Improving approaches to early and sustainable return-to-work in the construction sector', Application Number MCLE2016'.

# 7 Recommendations for Policy

The project findings are largely descriptive, which limits our ability to provide recommendations around specific policies and practices. However, the findings of this report lead to several general policy recommendations.

## 7.1 Increased focus on how RTW policy and practice changes affect industry response

The finding that there was a jurisdiction/industry effect in disability outcomes suggest that RTW policies and practices have different effects at the industry level and that there may be compensation system, employer or worker response at the industry level that promote or impede timely RTW. Implementation of changes to RTW policy and practice should consider the effect of these changes across industries and implement monitoring to track implementation at the industry level.

## 7.2 Increased focus on gender at a determinant of RTW

A consistent finding from the gender analysis was that gender differences persisted even after adjusting for confounders in all provinces. We also found that gender difference in disability days paid were smallest in ON and largest in MB suggesting that jurisdiction practices matter in reducing gender differences in work disability. Finally, we found that while men were more likely to exit claim at short claim durations, they were less likely to exit claim for longer durations. These findings indicate that compensation boards should consider gender as key factor in claims management and RTW policy and practice. This may mean that claims managers are more conscious of the gendered structure of work. In particular, claims management practices may need to address the barriers to RTW that women face for shorter duration claims and the barriers that men face for longer duration claims.

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