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Differences in Modified-Return-to-Work by Immigration Characteristics Among a Cohort of Workers in British Columbia, Canada

Sonja Senthanar¹ · Mieke Koehoorn¹ · Lillian Tamburic¹ · Stephanie Premji² · Ute Bültmann³ · Christopher B. McLeod¹

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Abstract

Introduction To investigate differences in modified-return-to work (MRTW) within the first 30 days of a work-related, short-term disability injury by immigration characteristics. This question was part of a program of research investigating differences in work and health experiences among immigrant workers and explanations for longer work disability durations. **Methods** Workers' compensation claims, immigration records and medical registry data were linked to identify a sample of workers in British Columbia, Canada with a short-term disability claim for a work-related back strain, concussion, limb fracture or connective tissue injury occurring between 2009 and 2015. Multivariable logistic regressions, stratified by injury type, investigated the odds of MRTW, defined as at least one day within the first 30 days on claim, associated with immigration characteristics, defined as a Canadian-born worker versus a worker who immigrated via the economic, family member or refugee/other humanitarian classification. **Results** Immigrant workers who arrived to Canada as a family member or as a refugee/other immigrant had a reduced odds of MRTW within the first 30 days of work disability for a back strain, concussion and limb fracture, compared to Canadian-born workers. Differences in MRTW were not observed for immigrant workers who arrived to Canada via the economic classification, or for connective tissue injuries. **Conclusion** The persistent and consistent finding of reduced MRTW for the same injury for different immigration classifications highlights contexts (work, health, social, language) that disadvantage some immigrants upon arrival to Canada and that persist over time even after entry into the workforce, including barriers to MRTW.

Keywords Modified-return-to-work · Immigration · Workers' compensation · Rehabilitation

Introduction

Successful return-to-work (RTW) following a work-related injury is less likely the longer the work disability duration [1]. Modified-return-to-work (MRTW) is intended to gradually enable injured workers to return to work via modified

tasks and accommodated work hours [1–3] and, is a universally accepted practice within the organizational context. For example, across OECD countries, employer-based MRTW programs have been found to be related to continued employment following disability [4–7] and faster return to work and/or reduced work disability days [8–12].

The evidence base in Canada parallels findings in other countries. For instance, a systematic review of workplace based interventions for workers with musculoskeletal conditions published in 2004 found strong evidence that MRTW activities reduced time away from work [2]. A recent extension of this work that included musculoskeletal and mental health conditions similarly found moderate effects of MRTW as a single-domain intervention in improving return to work outcomes [13].

In certain Canadian provinces MRTW is a mandated practice. The Human Rights Code in the Canadian

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jurisdiction of British Columbia, for example, requires employers to accommodate injured workers up to the point that the duty to accommodate does not impose an undue hardship on the employer [14]. Further, the Workers' Compensation Act of British Columbia states an obligation to "aid in getting injured workers back to work or to assist in lessening or removing a resulting handicap" through a 5-step sequential process that includes work modifications or worker accommodations [15].

Studies investigating MRTW provide limited evidence for immigrant workers at the intersection of contextual vulnerabilities related to non-standard, precarious and physically demanding employment positions [16, 17] that impact the availability of, access to, and participation in, MRTW options [18, 19]. For example, immigrant workers may not always understand or be aware of their rights to accommodation and modification [20, 21]. Language barriers for immigrant workers may contribute to difficulties understanding or communicating about RTW and MRTW with health care professionals, employer-based human resources personnel, work supervisors or workers' compensation providers [21–24]. Further, immigrant workers in precarious employment relationships may be less connected to networks such as a labour union to help advocate for MRTW. Finally, immigrant workers are more likely to work in hazardous positions or physically demanding conditions, compared to Canadian-born workers, that may be a barrier to MRTW or that are associated with a higher risk of severe work injury that preclude MRTW [25–28].

A better understanding of MRTW following a work injury is warranted given evidence of longer disability durations among immigrant workers compared to Canadian-born workers [29, 30], and given the fact that prior research on MRTW has not investigated differences by immigration status [9, 31] or as a primary outcome of interest [21, 22, 27, 32]. The current study sought to address these evidence needs using population-based, linked administrative data to examine differences in MRTW for immigrants compared to Canadian-born workers with a work-related injury in the province of British Columbia, Canada. Specifically, we hypothesized that MRTW for workers on short-term disability (STD) benefits for work-related injury within the initial 30 days of work disability would not differ by immigration characteristics. Work disability following work-related injury is generally temporary with most workers returning to work within 30 days. The 30-day disability window was selected as a critical period for investigating differences in MRTW by immigration characteristics as the acute phase of the disability continuum, after which workers are less likely to return-to-work and to have long-term work disability [28, 33, 34].

Methods

Data Sources/Setting

Administrative data from WorkSafeBC, the workers' compensation system in British Columbia (claims data) [35], the British Columbia Ministry of Health (health registration data) [36], and Immigration, Refugees, and Citizenship Canada (IRCC) (permanent resident data) [37] were linked at the individual-level by Population Data BC to construct a cohort of injured workers with an accepted compensation claim by immigration status, with authorization for access and use of the data for research purposes provided by the data stewards [38].

WorkSafeBC operates as a no-fault system, funded through employer paid insurance premiums, and provides STD payments (up to 90% of a workers' pre-injury wage) and other health and rehabilitation benefits for work-related injuries and illnesses, with the goal of timely RTW for workers. During the study period, 95% of workers in the province of British Columbia were covered for workers' compensation insurance [39]. The British Columbia Ministry of Health (MoH) oversees the public healthcare system in the province and provided sociodemographic data via their health registration file for characteristics not otherwise available in the claims data. The IRCC Permanent Resident database is a repository of individuals who have been granted permanent resident status in Canada since 1985 and provided data on immigration status.

Injury Study Samples

Figure 1 provides a summary of the construction of a cohort of injured workers with compensation claims linked to immigration records in British Columbia, Canada. For the current analyses, the cohort was restricted to the first STD claim (at least one paid work disability day) per worker for back strain, concussion, connective tissue, and upper and lower limb fracture injuries occurring May 2009 to December 2015, for workers aged 15 to 85 years old. These injury cohorts were intentionally selected to represent variable work disability contexts to investigate associations between immigration characteristics and MRTW, including for acute (e.g. fracture) and chronic (e.g. back strain) injuries, and episodic (e.g. concussion) and gradual (e.g. connective tissue) recovery trajectories, but also for STD injuries that are amenable to MRTW. Eligible injuries were identified using the International Classification for Disease version 9 (ICD-9). The cohort was restricted to those on STD benefits for more than 30 days based on prior work disability duration research [31, 40] and to

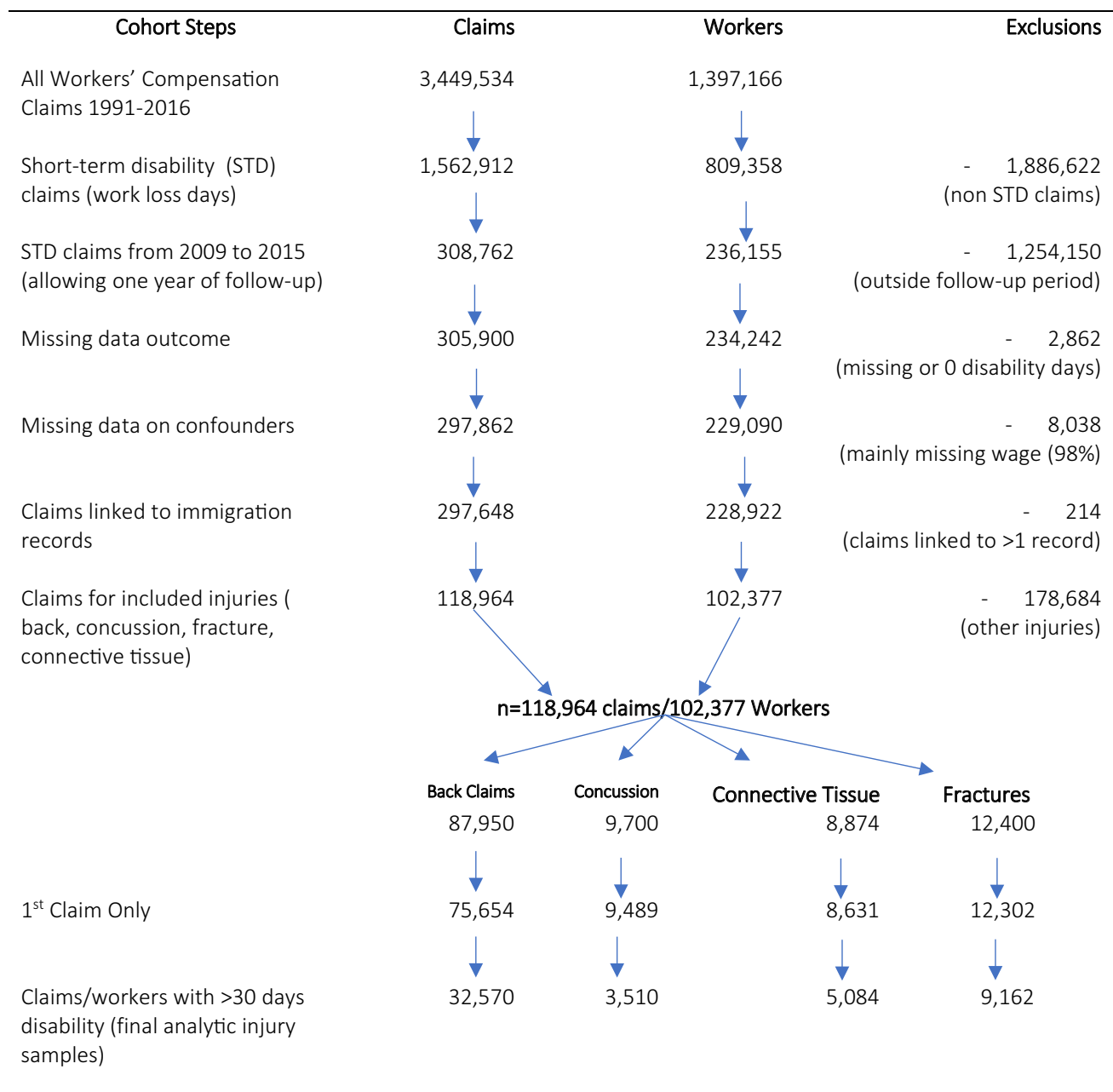


Fig. 1 Flowchart for construction of study cohort of injured workers in British Columbia, Canada and analytic injury samples for investigation of relationships between MRTW and immigration characteristics

provide a comparable window of opportunity for MRTW. Workers were excluded from the study if they were missing data on any of the analytic study variables.

Study Variables

The primary outcome was MRTW as recorded daily in WorkSafeBC's data for injured workers receiving STD compensation claims benefits. MRTW was defined as a

dichotomous outcome of no MRTW on any day within the first 30 days¹ on STD benefits for injury, or yes for MRTW with at least one day of MRTW within the first 30 days on STD benefits for their injury.

¹ Workers could have had MRTW beyond the 30-day window but the purpose of this analyses was focused on MRTW within the critical 30-day window of acute work disability.

The primary explanatory variable was immigration classification based on 67 immigration categories in the IRCC database that were grouped and defined as a worker who immigrated to Canada as an (a) economic immigrant, (b) family member, or (c) refugee/other classification; or as a Canadian-born worker if there was no record of immigration in the IRCC database. More information about immigration classification can be found in Senthanar et al. [30]. Briefly, economic immigrants are selected for their ability to contribute to Canada's economy and to meet labour market needs; family member immigrants are sponsored by a Canadian citizen and are granted resident status on the basis of their relationship to the sponsor; refugees are immigrants granted permanent resident status on the basis of a well-founded fear of returning to their home country (e.g. civil war, armed conflict), while the 'other' category refers to immigrants who are granted permanent residence for humanitarian or compassionate reasons. For the purpose of this analysis, refugees and others have been grouped together as representing similar contexts.

The following variables were included as potential confounders based on prior research of the determinants of work disability related outcomes [28] and those with an association with immigration classification: (1) age at time of injury, derived from the claims data and categorized into 10-year age groupings (15–24, 25–34, 35–44, 45–54, 55+ years); (2) sex coded in the claims data and MoH registry as male or female; (3) annual wage at time of injury, derived from the claims data and categorized into five wage quintiles; (4) worker occupation, coded in the claims data and classified into 9 broad occupations according to the 2006 National Occupation Classification; (5) claim year at time of injury (2009 to 2015) found in the claims data and; (6) history of any prior workers' compensation claim, derived from the claims data and categorized as 'yes' if there was > 1 claim in the preceding 5 years and 'no' otherwise. The sex variable is subsequently referred to as the 'sex/gender' variable in the analyses and results, with the assumption that the 'sex' field on an administrative record is completed by individuals using both social (gender) and physical (sex) constructs [41] and that any observed differences in work disability outcomes would represent the effect of these constructs synergistically.

Data Analysis

Descriptive statistics were used to compare the distribution of injured workers on full disability with MRTW and without MRTW across the four injury cohorts.

Bivariable logistic models examined the unadjusted relationship between immigration classification (Canadian-born workers as the reference group) and MRTW within 30 days (yes as the reference group) for workers on STD

compensation claims benefits for the four injury types. Confounders significantly associated with MRTW based on prior research and associated with immigration classification in logistic regression models were included in multivariable models for adjusted estimates of the main relationship. The multivariable logistic regression analyses are presented as odds ratios (ORs) with 95% confidence intervals (CI) where an OR less than '1' specifies a decreased odds of MRTW within 30 days for immigrant workers compared to Canadian-born workers. All statistical analyses were performed in Stata V.16.0 (Stata Corp).

Ethical approval of the research was obtained from the Behavioural Research Ethics Board at The University of British Columbia (H17-02078).

Results

Descriptive Results

The characteristics of the study injury samples are summarized in Table 1. Approximately three-quarters of workers with back strain, concussion and connective tissue injuries, and 87% of workers with limb fractures, had no MRTW within 30 days of their STD claim during the study period from 2009 to 2015. Within the back strain, concussion and limb fracture samples, workers without MRTW were more likely to be family member and refugee/other immigrant workers. These differences were not evident among workers with connective tissue injuries.

Modeling Results

Multivariable models examining the relationship between immigration classification and MRTW by injury type, adjusted for all of the confounding variables, are presented in Table 2. Overall, in the final adjusted models, workers who immigrated to Canada via the family member or as a refugee/other classifications, compared to Canadian-born workers, had a decreased odds of MRTW within 30 days while on STD claims for back strain (family member (OR = 0.73; 95% CI 0.67, 0.79); refugee/other (OR = 0.75; 95% CI 0.66, 0.86)), concussions (family member (OR = 0.83; 95% CI 0.60, 1.14); refugee/other (OR = 0.74, 95% CI 0.45, 1.21)) and for limb fractures (family members (0.78, 95% 0.59, 1.02) and refugee/other (OR = 0.43; 95% CI 0.24, 0.76)). The confidence intervals around the estimates for concussions included '1' indicating imprecision around the effect for the smallest injury group.

Across injury types, workers who immigrated to Canada in the economic classification had similar odds of MRTW to that of Canadian-born workers and with 95% CIs around the estimates that all included '1', ranging from an OR of

Table 1 Socio-demographic and socio-economic characteristics of injured workers on full work disability for 30 days who had an accepted workers' compensation between 2009 and 2015, by injury cohort

	Back strain		Concussion		Connective tissue		Fractures	
	Workers with-out MRTW	Workers with MRTW	Workers with-out MRTW	Workers with MRTW	Workers with-out MRTW	Workers with MRTW	Workers with-out MRTW	Workers with MRTW
	n=22,886 (70.3%)	n= 9684 (29.7%)	n=2736 (77.9%)	n=774 (22.1%)	n=3948 (77.7%)	n=1136 (22.3%)	n=8012 (87.4%)	n=1150 (12.6%)
Column %								
Variables								
<i>Immigration Classification of Worker^a</i>								
Family member	10.9	8.6	8.1	7.4	6.5	6.6	7.9	5.7
Economic	8.9	9.4	7.9	8.7	7.5	7.5	7.3	6.8
Refugee/Other	3.8	3.0	3.4	2.6	3.0	3.1	2.5	1.1
Canadian-born worker	76.4	79.0	80.6	81.4	83.0	82.8	82.3	86.4
<i>Sex</i>								
Men	56.1	48.8	55.7	44.2	53.2	45.3	72.0	11.4
Women	43.9	51.2	44.3	55.8	46.7	54.7	28.0	15.3
<i>Age in years at time of injury</i>								
15–24	8.5	10.5	14.0	12.9	7.9	11.6	12.3	13.6
25–34	20.7	22.0	19.9	22.5	17.1	19.2	19.7	20.6
35–44	25.0	24.9	21.8	22.4	22.7	23.9	18.2	15.7
45–54	28.9	27.4	26.4	27.7	35.6	30.6	25.2	26.2
55 and older	16.9	15.1	18.0	14.6	16.7	14.8	24.7	23.9
<i>Occupation at time of injury</i>								
Management/Bus	6.2	9.6	10.2	16.7	6.5	8.6	8.0	14.5
Natural/App. Sc.	1.4	1.6	2.1	2.2	1.9	1.3	1.8	3.2
Health	17.8	18.5	7.2	5.4	12.9	13.6	4.2	4.1
Social Sc.	5.1	3.4	9.5	7.1	2.8	1.5	4.4	4.4
Art/Culture	1.0	1.2	2.8	4.1	0.9	0.7	2.0	3.1
Sales/Service	22.8	27.7	24.3	31.9	26.4	32.3	18.0	20.5
Trades/Transp.	35.9	28.9	33.4	23.4	33.1	26.9	46.8	38.8
Primary	3.4	2.1	4.5	2.7	4.9	4.7	6.7	3.3
Manufacturing	6.4	7.1	6.0	6.5	10.8	10.4	8.2	8.1
<i>Injury year</i>								
2009	10.9	9.2	5.2	3.8	10.6	9.4	10.9	10.1
2010	16.0	15.4	9.4	10.1	15.5	13.1	15.7	13.7
2011	15.8	15.2	13.7	12.7	15.1	13.8	15.4	15.6
2012	15.3	14.6	15.8	15.0	14.8	14.7	14.3	12.6
2013	14.5	15.3	16.0	15.4	15.2	15.6	13.8	16.1
2014	14.0	15.0	19.6	20.0	14.0	14.4	14.2	16.0
2015	13.6	15.2	20.2	23.1	14.8	19.0	15.8	16.0
<i>Any Previous Compensation Claim in past 5 years^b</i>								
No	48.8	48.8	52.5	54.5	45.5	47.6	60.8	59.6
Yes	51.2	51.2	47.6	45.5	54.5	52.4	39.2	40.4
<i>Wage at time of injury</i>								
1st quintile	19.4	20.3	22.6	23.3	17.3	20.9	22.0	18.9
2nd quintile	20.6	20.3	18.6	20.3	21.0	22.0	18.6	16.6
3rd quintile	20.9	21.4	17.5	18.7	20.6	20.5	18.2	15.7
4th quintile	19.6	20.8	19.0	19.0	20.6	22.2	18.1	24.5
5th quintile	19.5	17.2	22.3	18.6	20.5	14.4	23.1	24.4

MRTW modified-return-to work

^aGrouped into four classes depending on the immigration classification upon arrival into Canada^bAny previous workers' compensation claim in the past 5 years

Table 2 Multivariable^a logistic regression models, stratified by injury type, for association between immigration characteristics and MRTW (no versus yes to at least one day) within the first 30 days of a work-related short-term disability claim among workers in British Columbia, Canada

	Back strain injuries (n = 32,570)	Concussion injuries (n = 3510)	Connective tissue inju- ries (n = 5084)	Upper and lower limb fracture injuries (n = 9162)
<i>OR (95% CI)</i>				
<i>Immigration classification of worker</i>				
Economic	0.98 (0.90,1.06)	0.99 (0.74,1.34)	0.98 (0.75,1.27)	0.89 (0.69,1.14)
Family member	0.73 (0.67,0.79)	0.83 (0.60,1.14)	0.96 (0.73,1.27)	0.78 (0.59,1.02)
Refugee/other	0.75 (0.66,0.86)	0.74 (0.45,1.21)	1.06 (0.72,1.56)	0.43 (0.24,0.76)
Canadian-born	Ref.	Ref.	Ref.	Ref.
<i>Sex</i>				
Women	Ref.	Ref.	Ref.	Ref.
Men	0.75 (0.70,0.80)	0.68 (0.56,0.83)	0.80 (0.67,0.95)	0.76 (0.64,0.90)
<i>Age at time of injury</i>				
35–44	Ref.	Ref.	Ref.	Ref.
15–24	1.27 (1.16,1.40)	0.90 (0.67,1.22)	1.38 (1.06,1.78)	1.43 (1.13,1.82)
25–34	1.09 (1.02,1.18)	1.13 (0.88,1.44)	1.10 (0.90,1.36)	1.26 (1.03,1.56)
45–54	0.91 (0.85,0.97)	1.03 (0.81,1.30)	0.80 (0.67,0.96)	1.10 (0.90,1.34)
55 and older	0.84 (0.78,0.91)	0.77 (0.59,1.02)	0.82 (0.65,1.02)	0.99 (0.80,1.21)
<i>Occupation at time of injury</i>				
Trades/Transp.	Ref.	Ref.	Ref.	Ref.
Management/Bus	1.77 (1.61,1.96)	1.88 (1.42,2.51)	1.53 (1.15,2.03)	2.17 (1.74,2.70)
Natural/App. Sc.	1.33 (1.09,1.62)	1.32 (0.74,2.35)	0.90 (0.51,1.60)	1.96 (1.34,2.86)
Health	1.04 (0.95,1.14)	0.80 (0.54,1.21)	1.16 (0.89,1.50)	1.00 (0.70,1.43)
Social Sc.	0.67 (0.59,0.77)	0.79 (0.55,1.13)	0.58 (0.34,1.00)	1.01 (0.72,1.41)
Art/Culture	1.20 (0.96,1.52)	1.82 (1.15,2.88)	0.94 (0.42,2.07)	1.77 (1.20,2.61)
Sales/Service	1.38 (1.28,1.49)	1.59 (1.23,2.05)	1.30 (1.05,1.60)	1.47 (1.20,1.79)
Primary	0.72 (0.61,0.85)	0.82 (0.50,1.34)	1.06 (0.76,1.49)	0.61 (0.43,0.86)
Manufacturing	1.39 (1.25,1.54)	1.41 (0.98,2.03)	1.12 (0.87,1.43)	1.24 (0.97,1.58)
<i>Injury year</i>				
2009	Ref.	Ref.	Ref.	Ref.
2010	1.15 (1.04,1.26)	1.52 (0.94,2.46)	1.00 (0.76,1.33)	0.92 (0.71,1.19)
2011	1.16 (1.05,1.27)	1.33 (0.84,2.12)	1.05 (0.79,1.39)	1.08 (0.84,1.39)
2012	1.16 (1.05,1.28)	1.29 (0.82,2.04)	1.13 (0.86,1.49)	0.89 (0.68,1.16)
2013	1.32 (1.19,1.45)	1.39 (0.88,2.19)	1.19 (0.90,1.56)	1.22 (0.95,1.57)
2014	1.33 (1.20,1.46)	1.47 (0.94,2.30)	1.20 (0.91,1.59)	1.19 (0.93,1.53)
2015	1.40 (1.27,1.55)	1.62 (1.04,2.52)	1.54 (1.18,2.01)	1.08 (0.84,1.39)
<i>Previous workers compensation claim in last five year</i>				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.05 (1.00,1.10)	1.00 (0.85,1.18)	1.00 (0.87,1.14)	1.07 (0.94,1.22)
<i>Wage at time of injury</i>				
1st quintile	Ref.	Ref.	Ref.	Ref.
2nd quintile	1.02 (0.95,1.11)	1.12 (0.87,1.45)	0.94 (0.76,1.16)	1.12 (0.91,1.39)
3rd quintile	1.11 (1.03,1.20)	1.20 (0.92,1.27)	0.97 (0.78,1.21)	1.10 (0.89,1.36)
4th quintile	1.23 (1.13,1.33)	1.17 (0.89,1.55)	1.12 (0.89,1.41)	1.84 (1.49,2.26)
5th quintile	1.09 (1.00,1.19)	1.09 (0.82,1.45)	0.80 (0.62,1.03)	1.54 (1.24,1.90)

CI confidence interval, OR odds ratio, Ref reference category

0.89 (95% CI 0.69, 1.14) for limb fractures to 0.99 (95% CI 0.74, 1.34) for concussions. Finally, there were similar odds of MRTW among all immigrant worker classifications compared to Canadian-born workers for connective tissue injuries, ranging from an OR of 0.96 (95% CI 0.73, 1.27) to 1.06 (95% CI 0.72, 1.56) among family member and refugee/other immigrant workers, respectively.

In terms of the face validity of the model and the relationships between the confounders and the MRTW outcome, men and workers aged 55 years and older had a decreased odds of receiving MRTW, while workers with higher wages had an increased odds of MRTW, within 30 days of injury.

Discussion

Key findings from the current study were three-fold. First, immigrant workers who arrived to Canada as a family member or as a refugee/other immigrant had a reduced odds of MRTW within the first 30 days of work disability for a back strain, concussion and limb fracture, compared to Canadian-born workers. Second, the previous finding of a reduced odds for MRTW was not observed for workers who arrived to Canada as an economic immigrant. Finally, differences in MRTW within the first 30 days of work disability were not evident for workers with connective tissue injuries by immigration classification. By way of explanation for the lack of findings for the connective tissue injury sample, this injury sample was the most variable of the four samples for included injuries and diagnoses. For example, back strain included ICD9 codes for strains and sprains by part of the back (e.g. lumbrosacral, thoracic, lumbar), concussions by level of loss of consciousness (e.g. brief, moderate, prolonged) and fractures by type of limb (upper and lower); but connective tissue injuries included, for example, rotator cuff disorders, synovitis, tenosynovitis, bursitis, tendon rupture, and bunions. This variability in connective tissue injuries, including variability associated with treatment guidelines and rehabilitation options such as MRTW, offers the most plausible explanation for the masking of the differences by immigration characteristics that were consistently observed in the other three injury samples.

MRTW is intended to assist with timely return to work and to reduce unnecessary work disability duration and burden for injured workers [2, 8–10], especially for injuries classified as STD where the worker is expected to return to work and full-duties. The findings in the current study of reduced odds of MRTW for immigrant workers who arrive to Canada via the family member or refugee/other classifications may be explained by more severe injuries, attributable to collective differences in their working conditions or work tasks, that precludes MRTW within the first 30 days of the injury. Or, for injuries with similar severity, immigrant

workers who arrive via classifications other than the economic one, are more likely to work in precarious, risky or physically demanding occupations that preclude offers of, or participation in, MRTW. Prior research has found that immigrants, especially family member and refugee/other immigrants, are concentrated in “survival jobs” [27] that expose them to a higher risk of injury and more severe injuries [42]. Emerging evidence also suggests that small businesses are often unable to offer MRTW, due to a lack of resources or specialist personnel, for example [43, 44]. Immigrant workers may be more likely to work for small businesses by way of settlement agencies or ethnic ties in the community. While not assessed in this current study, future research should examine the effect of firm size on the association between MRTW and immigration classification.

To test study assumptions, we used the Barell matrix [45] to estimate injury severity and found insufficient variation in ICD-9 diagnostic codes to estimate severity for the back strain, concussion and connective tissue injury cohorts. Within the fracture cohort, workers with a hip or thigh fracture had a higher severity score (3) than those with an arm or leg fracture (2). However, we argue that this severity difference on a scale from 1 to 4 does not confound the observed relationship between immigration classification and MRTW, and as observed in the other injury cohorts with no variability in injury severity. Additional methods to minimize bias due to injury severity included stratifying the analyses by injuries defined by specific ICD-9 diagnostic codes; including only workers with injuries for STD where the worker is expected to return to their same tasks, occupation and employer; including only injuries where the worker had been on STD benefits for more than 30 days; investigating if MRTW occurred within a defined window of the first 30 days of work disability; and adjusting for confounders related to injury severity such as age, sex/gender, occupation and wage level. The analyses also adjusted for occupation using standardized occupational coding, but this measure does not take into consideration other characteristics associated with ‘survival jobs’ that may contribute to residual confounding associated with immigration classification and MRTW.

The findings of a reduced odds of MRTW for immigrants who arrive to Canada via the family member or refugee/other classifications, not observed for economic immigrants, highlight the contexts that disadvantage some immigrants and that persist over time even after entry into the workforce. Conversely, economic immigrants are more likely to have comparable skilled and quality employment positions to Canadian workers upon arrival based on the language abilities, education and work experiences required for immigration to Canada. Family members and refugees are selected for immigration to Canada based on family reunification or humanitarian needs, and face challenges in the Canadian

labour market because of language barriers, or work experiences and foreign credentials that are not recognized [42, 46, 47]. A lack of proficiency in English or French, as Canada's two official languages, is associated with complexities communicating with a benefit provider, health care professional or employer/supervisor [21, 23, 24, 47], and navigating compensation benefits, that may explain fewer opportunities for MRTW. Job and income insecurity may also mean that immigrant workers are less willing to request MRTW as an intervention or that workers may be unaware of their right to work accommodation [21, 26]. Further, a significant evidence base points to how these factors (language barriers, lack of awareness around rights, fear of employer reprisal in an already tenuous job) intersect to preclude immigrant workers from negotiating MRTW [21, 23, 48–50]. For example, one study by Nazari (2020) [51] found that immigrant workers often hid their injuries from employers and when pain and disability worsened, were unsure how to seek information about work disability efforts including rehabilitation and compensation benefits. The observed reduced odds of MRTW may therefore represent a combination of poor working and employment conditions (not captured by the occupation variable) and lower social capital for family member and refugee immigrants that result in barriers to MRTW. These explanations are underscored by the lowest odds of MRTW for refugees/other immigrants with a limb fracture, an injury for which there are standard clinical treatment guidelines and recovery windows [e.g. 33, 52] that should mitigate differences in the provision of MRTW for immigrant workers by classification, unless there is systemic discrimination and barriers based on their contexts.

Strengths and Limitations

A key strength of the current study included a population-based sample of STD compensation claims linked with immigration records for access to unprecedented data for the investigation of differences in MRTW by immigration classification. The immigration records provided access to more detailed characteristics not readily available in many work disability studies and that were associated with meaningful and persistent differences in MRTW, and that represented surrogate measures of different contexts associated with different experiences among workers who immigrate to Canada. The methodological decision to include claims with work disability durations greater than 30 days was employed to minimize selection bias, reduce confounding due to difference in severity (see above), and focus on inequities in MRTW among immigrant and Canadian-born workers within a specified window where MRTW was expected for a STD injury.

Reliance on linked administrative data using probabilistic linkage procedures may be subject to misclassification of

some immigrant workers as Canadian-born workers. However, the linkage rate in this study was comparable to other linkages using the Immigration, Refugees and Citizenship Canada database [53] and any misclassification is hypothesized to be nondifferential by MRTW status with a conservative effect on the observed findings. Future research on differences in MRTW for immigrant workers may benefit from more detailed investigation of the nature of the work modifications that was not available in the current study data. Further, the MRTW measure in the current study did not distinguish if an immigrant worker is less likely to be offered access to MRTW, more likely to face barriers when offered MRTW, or less likely to be aware that MRTW is available. The administrative data provided rich data to establish differences but not to explain these differences. However, the persistent and consistent effect of a reduced odds of MRTW for three of the four injury groups, including acute and chronic injuries, among family and refugee/other immigrant classifications, provides a strong signal of inequities in MRTW regardless of reasons of access, barriers or awareness. The findings are considered generalizable for the working population of British Columbia. The findings may be generalizable to other jurisdictions in Canada but are limited by differences in provincial workers' compensation systems, MRTW guidelines and duty to accommodate policies.

Implications

The current study found a persistent difference in MRTW for workers who immigrated to Canada via the family member and refugee/other immigration classifications, compared with Canadian-born workers and not found in workers who immigrated via the economic classification. The findings point to inequities in disability management that warrant the attention of employers, workers' compensation and occupational health professionals. The findings also point to inequities for family member and refugee immigrants upon arrival to Canada that persist over time after entry to the workforce with the occurrence of a work injury. These inequities are at a societal level that may warrant attention and intervention with immigration support services related to educational and employment opportunities upon arrival to Canada. The observed differences also lend credence to underlying contexts that may negatively impact workers' eligibility to, and the appropriateness of, benefits and services for rehabilitation and RTW. Interpretation, translation and sign language services, for instance, are provided by WorkSafeBC to promote equity in access yet, these services are often outsourced to settlement agencies and community organizations. While unclear of the effect of these language services in British Columbia, research in other jurisdictions such as Ontario has found that similar language services are not systematically

applied throughout the return-to-work process and may lead to incomprehension of a worker's right to work accommodation, abuse in power by employers who may exploit their incomprehension, and misperception and miscommunication involving care providers and adjudicators [22–24, 45]. Thus, there is value in evaluating the effectiveness of the provision of interpretation services for barriers to MRTW. A duty to accommodate an injured worker is mandated in the province of British Columbia through the Human Rights Code of BC, but this is not enforced by WorkSafeBC. However, offering MRTW is strongly encouraged by WorkSafeBC, but is offered at the discretion of the employer that may introduce biases for low waged and 'replaceable' immigrant workers. In contrast, other Canadian compensation regulators mandate accommodation of workers, including offering MRTW within respective governing legislation, although these offers of MRTW may not always align with a worker's rehabilitation [19, 54]. Thus, in the absence of legislature changes, we argue that there is a need for education or training at the employer level to provide appropriate MRTW that fits the needs of injured workers. Specific to immigrant workers, we argue for outreach to immigrant communities (through settlement agencies, for example) to create awareness around RTW support including negotiating fair RTW and MRTW and access to compensation benefits following a work injury or illness.

Author Contributions MK, SP, UB and CBM conceived the research question and study design. SS and LT lead the data analysis. SS drafted the manuscript, with input and revisions from all study authors. All authors have read and reviewed the manuscript.

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Data Availability Data was obtained from a third party and are not publicly available. The workers' compensation, immigration data, and Ministry of Health were made available to the researchers by Population Data BC (www.popdata.bc.ca) with permission from the data stewards. The data was made available for the sole purposes of achieving the research objectives and is not available for sharing.

Declarations

Competing interest The authors declare they have no competing interests.

Ethics Approval Ethical approval was obtained from the Behavioural Research Ethics Board at The University of British Columbia (H17-02078).

Consent to Participate Not applicable.

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References

- Krause N, Dasinger LK, Neuhauser F. Modified work and return to work: A review of the literature. *J Occup Rehabil*. 1998;8(2):113–139.
- Franché R-L, Cullen K, Clarke J, Irvin E, Sinclair S, Frank J, et al. Workplace-based return-to-work interventions: A systematic review of the quantitative literature. *J Occup Rehabil*. 2005;15(4):607–631.
- Foster J, Barnetson B, editors. Disability management and return to work. In: *Health and Safety in Canadian Workplaces*. Edmonton: Athabasca University Press; 2016.
- Blinder V, Eberle C, Patil S, Gany FM, Bradley CJ. Women with breast cancer who work for accommodating employers more likely to retain jobs after treatment. *Health Aff*. 2017;36(2):274–281.
- Hill MJ, Maestas N, Mullen KJ. Employer accommodation and labor supply of disabled workers. *Labour Econ*. 2016;41:291–303.
- Høgelund J, Holm A. Worker adaptation and workplace accommodations after the onset of an illness. *IZA J Labor Policy*. 2014;3(1):17.
- Burkhauser RV, Butler JS, Kim YW. The importance of employer accommodation on the job duration of workers with disabilities: a hazard model approach. *Labour Econ*. 1995;2(2):109–130.
- Krause N, Lund T. Returning to work after occupational injury. In J. Barling & M.R. Frone, editors, *The Psychology of Workplace Safety* (pp. 265–295). American Psychology Association. 2004. <https://doi.org/10.1037/10662-013>.
- Gensby U, Lund T, Kowalski K, Saidj M, Jorgensen AK, Filges T, et al. Workplace disability management programs promoting return to work: A systematic review. *Campbell Systematic Reviews*. 2012; 8(1).
- Cullen KL, Irvin E, Collie A, Clay F, Gensby U, Jennings PA, et al. Effectiveness of workplace interventions in return-to-work for musculoskeletal, pain-related and mental health conditions: An update of the evidence and messages for practitioners. *J Occup Rehabil*. 2018;28(1):1–15.
- Franché R-L, Severin CN, Hogg-Johnson S, Côté P, Vidmar M, Lee H. The impact of early workplace-based return-to-work strategies on work absence duration: a 6-month longitudinal study following an occupational musculoskeletal injury. *J Occup Environ Med*. 2007;49(9):960–974.
- McLaren CF, Reville RT, Seabury SA. How effective are employer return to work programs? *Int Rev Law Econ*. 2017;52:58–73.
- Cullen KL, Irvin E, Collie A, Clay F, Gensby U, Jennings PA, Hogg-Johnson S, Kristman V, Laberge M, McKenzie D, Newnam S, Palagyi A, Ruseckaite R, Sheppard DM, Shourie S, Steenstra I, Van Eerd D, Amick BC III. Effectiveness of workplace interventions in return-to-work for musculoskeletal, pain-related and mental health conditions: An update of the evidence and messages for practitioners. *J Occup Rehabil*. 2018;28(1):1–15.
- The Government of British Columbia. Human Rights Code. RSBC 1996. Chapter 210. Queen's Printer: Victoria, British Columbia. Available: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/00_96210_01.
- The Government of British Columbia Workers Compensation Act – BC Laws [RSBC 1979]. Chap. 437. Queen's Printer: Victoria, British Columbia. Available: <https://www.bclaws.gov.bc.ca/civix/document/id/92consol16/92consol16/79437>.

16. Fuller S, Vosko LF. Temporary employment and social inequality in Canada: Exploring intersections of gender, race and migration. *Soc Indic Res.* 2008;88(1):31–50.
17. Smith P, Chen C, Mustard C. Differential risk of employment in more physically demanding jobs among a recent cohort of immigrants to Canada. *Inj Prev.* 2009;15(4):252–258.
18. Shuey KM, Jovic E. Disability accommodation in nonstandard and precarious employment arrangements. *Work Occup.* 2013;40(2):174–205.
19. MacEachen E, Senthnanar S, Lippel K. Compensation for precarious workers in Ontario: Resistance from employers and limited voice for victims of work-related injuries. *PISTES.* 2021; 23(1).
20. Caidi N, Allard D. Social inclusion of newcomers to Canada: An information problem? *Libr Inf Sci Res.* 2005;27(3):302–324.
21. Kosny A, MacEachen E, Lifshen M, Smith P, Jaffri GJ, Neilson C, et al. Delicate dances: Immigrants workers' experiences of injury reporting and claim filing. *Ethn Health.* 2012;17(3):267–290.
22. Premji S. Barriers to return-to-work for linguistic minorities in Ontario: An analysis of narratives from appeal decisions. *J Occup Rehabil.* 2015;25:357–367.
23. Gravel S, Vissandjee B, Lippel K, Brodeur J-M, Patry L, Champagne F. Ethics and the compensation of immigrant workers for work-related injuries and illnesses. *J Immigr Minor Health.* 2010;12(5):707–714.
24. Côté D. Intercultural communication in health care: challenges and solutions in work rehabilitation practices and training: a comprehensive review. *Disabil Rehabil.* 2013;35(2):153–163.
25. Smith P, Chen C, Mustard C. Differential risk of employment in more physically demanding jobs among a recent cohort of immigrants to Canada. *Inj Prev.* 2009;15(4):252–258.
26. Yanar B, Kosny A, Smith PM Occupational health and safety vulnerability of recent immigrants and refugees. *Int J Environ Res Public Health.* 2018; 15(9): 2004.
27. Kosny A, Yanar B, Begum M, Al-khool D, Premji S, Lay MA, et al. Safe employment integration of recent immigrants and refugees. *J Int Migr Integr.* 2020;21(3):807–827.
28. Krause N, Frank JW, Dasinger LK, Sullivan TJ, Sinclair SJ. Determinants of duration of disability and return-to-work after work-related injury and illness: challenges for future research. *Am J Ind Med.* 2001;40(4):464–484. <https://doi.org/10.1002/ajim.1116>.
29. Saffari N, Senthnanar S, Koehoorn M, McGrail K, McLeod CB. Immigrant status, gender and work disability duration: Findings from linked workers' compensation and immigration data in British Columbia, *Can BMJ Open*,2021;11(12): <https://doi.org/10.1136/bmjopen-2021-050829>.
30. Senthnanar S, Koehoorn M, Tamburic L, Premji S, Bültmann U, McLeod CB. Differences in work disability duration for immigrant and Canadian-born workers in British Columbia, Canada. *Int J Environ Res Public Health: Special Issue Work Health Equity.* 2021;18(22):11794. <https://doi.org/10.3390/ijerph182211794>.
31. Maas ET, Koehoorn M, McLeod CB. Does gradually returning to work improve time to sustainable work after a work-acquired musculoskeletal disorder in British Columbia, Canada? A matched cohort effectiveness study. *Occup Environ Med.* 2021;78(10):715–723.
32. de Castro AB, Fujishiro K, Sweitzer E, Oliva J. How immigrant workers experience workplace problems: A qualitative study. *Arch Environ Occup Health.* 2006;61(6):249–258.
33. Daley D, Payne LP, Galper J, Cheung A, Deal L. Clinical guidance to optimize work participation after injury or illness: The role of physical therapists. *J Orthop Sports Phys Ther.* 2021;51(8):CPG1–CPG102. <https://doi.org/10.2519/jospt.2021.0303>
34. Burton A, Barty S, Wright I, Main CJ. *Obstacles to Recovery from Musculoskeletal Disorders in Industry.* London: HSE Books; 2005.
35. WorkSafeBC [creator]. WorkSafeBC claims, injured Worker, and return to work files. Population Data BC [publisher]. Linked Data Set. WorkSafeBC. 2018. Available: <http://www.popdata.bc.ca/data>.
36. British Columbia Ministry of Health [creator]. Consolidation File (MSP Registration & Premium Billing). Population Data BC [publisher]. Data Extract. MOH. 2019. Available: <http://www.popdata.bc.ca/data>.
37. Immigration R, and Citizenship Canada [creator]. Permanent Resident database. Population Data BC [publisher]. Data Extract. IRCC. 2020. Available: <http://www.popdata.bc.ca/data>.
38. Population Data BC. About PopData. 2021. Available: <https://www.popdata.bc.ca/about>.
39. Association of Workers' Compensation Boards of Canada. Detailed key statistical measures (KSM) report. 2015. Available: http://awcbc.org/?page_id=9759.
40. McLeod CB, MacPherson R, Quirke W, Fan J, Amick IIIBC, Mustard CA, et al. Work disability duration: A comparative analysis of three Canadian provinces. Final report to the Workers' Compensation Board of Manitoba; July 2017.
41. Krieger N. Genders, sexes, and health: What are the connections—and why does it matter? *Int J Epidemiol.* 2003;32(4):652–657.
42. Smith PM, Mustard C. The unequal distribution of occupational health and safety risks among immigrants to Canada compared to Canadian-born labour market participants: 1993–2005. *Saf Sci.* 2010;48(10):1296–1303.
43. Macpherson RA, Lane TJ, Collie A, McLeod CB. Exploring differences in work disability by size of firm in Canada and Australia. *J Occup Rehabil.* 2022;32:190–202.
44. Anderson LP, Kines P, Hasle P. Owner attitudes and self reported behavior towards modified work after occupational injury absence in small enterprises: A qualitative study. 2007;17:107–121.
45. Clark DE, Ahmad S. Estimating injury severity using the Barell matrix. *Inj Prev.* 2006;12:111–116.
46. LaRochelle-Côté S, Hango DW Overqualification, skills and job satisfaction. Insights on Canadian Society Catalogue. Statistics Canada: 75-006-X. 2016.
47. Premji S, Begum M, Medley A, MacEachen E, Côté D, Saunders R. Return-to-work in a language barrier context: Comparing Quebec's and Ontario's workers' compensation policies and practices. *PISTES.* 2021. <https://doi.org/10.4000/pistes.7144>.
48. Premji S, Messing K, Lippel K. Broken English, broken bones? Mechanisms linking language proficiency and occupational health in a Montreal garment factory. *Int J Health Serv.* 2008;38(1):1–19.
49. Tucker S, Turner N. Waiting for safety: responses by young Canadian workers to unsafe work. *J Saf Res.* 2013;45:103–110.
50. Kazi MR, Ferdous M, Rumana N, Vaska M, Turin TC. Injury among the immigrant population in Canada: exploring the research landscape through a systematic scoping review. *Int Health.* 2019;11:203–214.
51. Nazari M. A community-based pilot study exploring work-related musculoskeletal disorders (WMSD) perception among recently relocated Syrian refugees in Canada [dissertation]. Waterloo (CA): University of Waterloo; 2020.
52. Oliveira CB, Maher CG, Pinto RZ, Traeger AC, Christine Lin C-W, Chenot J-F, et al. Clinical practice guidelines for the

- management of non-specific low back pain in primary care: an updated review. *Eur Spine J.* 2018;27(11):2791–2803.
53. Chiu M, Lebenbaum M, Lam K, Chong N, Azimae M, Iron K, et al. Describing the linkages of the immigration, refugees and citizenship Canada permanent resident data and vital statistics death registry to Ontario's administrative health database. *BMC Med Inform Decis Mak.* 2016;16:135. <https://doi.org/10.1186/s12911-016-0375-3>.
54. Billias N, MacEachen E, Sherifali S. "I grabbed my stuff and walked out": Precarious workers' responses and next steps when faced with procedural unfairness during work injury and claims processes. *J Occup Rehabil.* 2022. <https://doi.org/10.1007/s10926-022-10058-3>

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