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Social Support in the Workplace and Work-related Injury in Canada: A Cross-sectional Analysis

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Abstract

Objective: To determine the associations between social support at work and work-related injuries.

Methods: Canadian Community Health Survey data were used to measure repetitive strain injury and most serious injuries among respondents working in the past year. High, medium, or low workplace social support was determined by responses to questions about workplace conflict, supervisor and co-worker helpfulness.

Results: Both males and females reporting high social support were less likely to report a work-related repetitive strain injury (female odds ratio = 0.45; 95% CI= 0.32-0.63; male odds ratio = 0.64; 95% CI: 0.43-0.96). Workplace social support was not associated with the most serious injury.

Conclusions: We found an association between workplace social support and repetitive strain injury at work. Future studies need to examine this association prospectively to establish the causality of the association.

Keywords: Workplace social support; Worker; Accidents; Occupational; Wounds and injuries; Social environment

Introduction

Work-related injury is a major public health problem resulting in serious social and economic consequences worldwide. Annually, 271 million people suffer work-related injuries, and 2 million die as a consequence [1]. The economic loss associated with work-related injury and disease is equivalent to 4% of the world's gross national product [2]. In Canada, 8 out of every 100 workers file a workers' compensation claim for work-related injury or illness each year, costing over $6 billion (CDN) in 2005 [3]. Since underreporting of work-related injury is common these numbers likely represent underestimates [4,5].

The etiology of work-related injuries can be classified into three groups: 1) human (demographics, experience, stress reactions, knowledge, and attitudes); 2) job content (design of tasks, job schedules); and 3) environment (physical hazards, social and organizational factors, and physical stressors) [6]. But in reality, work-related injuries result from a complex interaction between multiple risk factors. Exposure to physical, mechanical and chemical hazards and the performance of unsafe practices by workers are the leading causes of work-related injuries [7-9]. Similarly, psychosocial factors, work arrangements, socio-demographic characteristics of workers, and environmental and social conditions are other potential risk factors for work-related injury [10-12].

In the late 70s, Karasek developed a model for describing workplace psychological stress and for explaining work-related illnesses and conceptualized that the level of stress a person feels at work is a function of two factors: psychological demand and authority over decisions (decision latitude) [13]. According to this model there are interactions between high psychological demand and low decision latitude [14]. High demand and low authority result in high stress and increased risk of deleterious effects on health, especially cardiovascular disease and mental health [13,15]. In 1996, Johnson added the third dimension of work-related social support to the Karaesek model and suggested that social support may modify the impact of psychosocial stress [16]. This model which is composed of psychological demand, decision latitude, and social support at work, is the most useful theoretical model for explaining work-related injuries. Workplace social support is defined as the help received from other people and can include emotional, instrumental, appraisal, and informational support [17]. Level of co-worker and supervisor social support is an established risk factor for workers' health [18-20]. However, there is inconsistent evidence for an association between worker self-reported social support and work-related injury. Some studies suggest positive associations [21-26], while others have found no association [27-32].

We also showed inconsistencies in literature in our previously conducted systematic review [19]. Differences in findings may be due to varying worker populations, varying measures of workplace social support, and lack of confounding control. In fact, very few studies have focused their analyses on the association between social support and work-related injury, opting rather to include social support as a covariate in other analyses of interest. For example, Cole et al. examined predictors of work-related repetitive strain injury (RSI) using the Canadian National Population Health Survey [33]. In their analysis, social support at work was excluded entirely from multivariate analyses.

Given the inconclusive evidence, we conducted a population-based study to determine the association between workplace social support and work-related injury. We hypothesized that workers reporting high level of support from their coworker and supervisors would be less likely to experience a work-related injury.

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Material and Methods

Data source

We used cross-sectional data from the 2005 Canadian Community Health Survey (CCHS), cycle 3.1, Public Micro data File for this study. The CCHS is cross-sectional survey collecting information related to health status, health care utilization and health determinants for the Canadian population [34]. Data for CCHS cycle 3.1 were collected between January and December, 2005. The CCHS collects responses from persons aged 12 or older, living in private occupied dwellings in all provinces and territories [34]. The survey excludes individuals living on Indian Reserves and Crown Lands, institutional residents, full-time members of the Canadian Forces, and residents of certain remote regions [34]. The CCHS covers approximately 98% of e Canadian population aged 12 and over. A multistage stratified cluster design was used with individual dwellings as the final sampling unit. Individual respondents were randomly selected within dwellings. Trained interviewers from Statistics Canada conducted the survey using computer assisted interviewing. Response to the survey was voluntary; the overall national response rate was 79% [34]. A full description of the CCHS is available [34].

Eligibility for our study included those reporting working at a job or business any time in the past year, between the ages of 15 and 75, and completing the worker social support exposure questions. The study protocol was reviewed and approved by the University Health Network Research Ethics Board.

Definition and measurement of workplace social support

We considered two emotional and instrumental aspects of social support at the workplace and defined workplace social support as "the help received from coworker and supervisors". We also included conflict at work in our measure which represents not only the lack of social support but the negative continuum of social relations.

Workplace social support was measured by three questions, which referred to the social climate surrounding the respondent at his or her main job in the past year. The three questions were: 1) "You were exposed to hostility or conflict from the people you worked with" (measure of a hostile environment), 2) "Your supervisor was helpful in getting the job done" (measure of supervisor social support), and 3) "The people you worked with were helpful in getting the job done" (measure of coworker social support) [35]. These items were optional content on the 2005 CCHS, so only questionnaires in Saskatchewan and Quebec included these questions. Over 93 percent of workers eligible to complete the workplace social support questions between the ages of 15 and 75 completed them. Five response categories ranged from "Strongly agree" (score 4) to "Strongly disagree" (score 0) with reverse scoring for the hostility question. A derived variable consisting of the sum of scores from the three questions ranged from 0 to 12. High scores on the derived variable (i.e., 9 to 12) indicated higher worker social support. Hence, we categorized the variable into "high" (scores 9 to 12), "medium" (scores 5 to 8), and "low" (scores 0 to 4) workplace social support levels.

Definition and measurement of work-related injury

Due to data availability, we used two definitions of work-related injury. First, we defined work-related repetitive strain injury (RSI) as an injury caused by overuse or by repeating the same movement frequently (for example, carpal tunnel syndrome, tennis elbow, or tendonitis) while at work. For respondents indicating a RSI serious enough to limit normal activities in the past year, work-relatedness was determined if they indicated their most serious RSI occurred while working at a job or business [35]. Second, we defined work-related serious injury (SI) as an injury other than repetitive strain that occurred in the past year while at work and was serious enough to limit normal activities (for example, a broken bone, a bad cut or burn, a sprain, or a poisoning). Work-related SI was identified in the same manner as described for RSI.

Respondents with a RSI or SI at work were compared to individuals not injured at work: a group injured outside of work (injured comparison), and a non-injured group. The injured comparison group was used to identify any unmeasured behavioral influences. For example, those with risk-taking behaviors may be more likely to experience injury and they may also be less likely to rely on resources from co-workers or supervisors, leading to reports of lower workplace social support.

Definition and measurement of covariates

Other independent variables considered in the analyses included demographic, health status, smoking, and job related information (table 1). Physical activity was measured by the Physical Activity

	Total (n =4,507,300)*	Low worker social support (n =165,600)*	Medium worker social support (n =1,990,200)*	High worker social support (n =2,360,500)*
Characteristic	**(%)**	**(%)**	**(%)**	**(%)**
Age				
15-24	19.6	12.8	17.2	22.0
25-34	21.0	21.0	21.5	20.6
35-44	23.6	26.9	25.4	21.8
45-54	22.8	26.4	23.1	22.3
55-64	11.4	12.0	11.3	11.6
65-74	1.6	Suppressed	1.5	1.8
Gender				
Male	53.6	49.3	54.3	53.2
Female	46.4	50.7	45.3	46.8
Education				
< Secondary	13.5	10.2†	13.8	13.5
Secondary	12.9	14.1	13.3	12.4
Some post-sec.	9.5	11.3	8.6	10.2
Post-sec. grad	64.1	64.4	64.3	63.9
Self-rated health				
Poor	5.2	7.8†	5.7	4.6
Good	94.8	92.2	94.3	95.4

Self-rated mental health				
Poor	3.0	7.7†	3.4	2.5
Good	97.0	92.3	96.6	97.5
Self-rated BMI				
Underweight(<18.5) Normal (18.5–24.9)	2.8	Suppressed	2.4	3.1
Overweight (25-29.9)	50.8	49.9	50.3	51.2
Obese (≥ 30)	32.2	32.4	31.9	32.4
	14.2	14.9	15.4	13.3
Physical activity				
Active	23.4	20.7	21.9	24.8
Moderate	25.5	29.3	25.6	25.2
Inactive	51.1	50.0	52.5	50.0
Depression				
High	3.4	8.4†	4.1	2.5
Medium	3.8	7.2†	3.9	3.4
Low	92.8	84.4	92.0	94.1
Smoking				
Current	27.5	30.9	28.9	26.2
Former	40.4	46.6	41.1	39.4
Never	32.1	22.5	30.0	34.4
Job Satisfaction				
Very Satisfied	41.2	16.2	33.7	49.1
Somewhat	49.6	45.5	53.8	46.3
Not very	6.8	23.9	9.3	3.5
Not at all	2.4	14.4	3.2	1.0
Decision authority				
Low	57.2	36.9	54.7	60.7
Medium	32.6	37.8	33.6	31.5
High	10.2	25.3	11.7	7.8
Psychological demands				
Low	17.8	9.1	13.8	21.6
Medium	53.5	43.9	52.9	54.8
High	28.7	47.0	33.3	23.6
Job insecurity				
Low	72.0	52.3	68.5	76.3
Medium	8.0	10.3	8.9	7.2
High	20.0	37.4	22.7	16.5
Physical exertion				
Low	51.7	49.6	50.8	52.6
Medium	9.5†	8.0	9.3	9.8
High	38.8	42.4	39.9	37.6
Hours worked				
< Normal	23.8	18	22.8	25.1
Normal (35-40hrs/wk)	45.9	48.3	45.0	46.4
> Normal	30.3	33.7	32.2	28.5
Work status				
Full time	83.2	88.6	84.6	81.6
Part time	16.8	11.4†	15.4	18.4
Current student				
Yes	17.3	13	15	19.5
No	82.7	87	85	80.5
Household income				
< 14,999	3.1	4.6†	3.2	3.1
15,000-29,999	9.6	9.1†	9.5	9.7
30,000-49,999	21.6	20.3	22.2	21.3
50,000-79,999	31.9	30.4	32.3	31.7
> 79,999	33.8	36.2	32.9	34.4

* The number of workers is weighted and values are rounded to the nearest 100; the total un-weighted n = 20,661
Percentages are adjusted for missing data and may not total to 100 due to rounding.
Un-weighted values less than 30 are suppressed
† The coefficient of variation is between 16.6% and 33.3%, which is considered marginal in terms of quality of the estimates by Statistics Canada.

Table 1: Characteristics of study population by worker social support status.

Index, which categorizes respondents as being "active", "moderate", or "inactive" based on the total daily energy expenditure (kcal/kg/day). Energy expenditure was calculated using the frequency and duration of self-reported physical activity in the last three months as well as the metabolic energy cost of the activity performed [36]. Depressed respondents were those feeling depressed or without interest in things for 2 weeks or more during the past year. The depression items were based on the work of Kessler and Mroczek [37].

To identify the independent impact of workplace social support on occurrence of injuries, other dimensions of work stress (based on Karasek's decision-demand-support model), job insecurity, and physical excretion at work were also measured in this study and included in multivariate analyses [38].

Decision authority was defined as the individual's potential control over the performance of the job and measured by one single question: 'Your job allowed you freedom to decide how you did your

job'. Psychological demands were defined as the effort required carrying out work [38] and measured by answers to two questions: "Your job was very hectic", and "You were free from conflicting demands that others made". Job insecurity was defined as perceived threat or reality of job termination or layoff faced by workers and measured by a direct question and physical exertion indicated if the job required a lot of physical effort. These questions were based on job stress items rated on a 5-point Likert scale ("strongly agree" to "strongly disagree") [39].

Statistical analysis

The prevalence of work-related RSI and SI were estimated according to level of workplace social support. Next, we conducted contingency table analyses of work-related RSI and SI by workplace social support to examine the unadjusted associations. Finally, multivariable logistic regression models estimated adjusted odds ratios and 95% confidence intervals.

We selected covariates theoretically associated with work-related RSI and/or SI and available in the dataset. Assessing RSI and SI separately, all statistically significant ($p<0.05$) covariates in the distribution across injury outcomes were included as potential extraneous variables in the multivariable analysis. Using the methodology described by Kleinbaum we constructed hierarchically well-formulated models [40]. Tests for interaction were performed for age, gender, and work status due to bivariate significance and plausibility of effect modification. Gender was an important effect modifier for the RSI analysis, so we constructed separate models by gender. Multivariable logistic regression analyses started with inclusion of all potential extraneous variables. We removed subsets of variables if their removal resulted in less than a 10% change in the point estimate. This resulted in several acceptable models. The final model had the best precision and parsimony.

The data publication guides by Statistics Canada were followed [34]. Sample weights were applied in analyzing study population characteristics so that the derived estimates could be considered representative of the total population of working adults between the ages of 15 and 75. Coefficients of variation were used to determine the quality of the estimates [34]. Accordingly, estimates that did not meet the Statistics Canada criteria were flagged. Additionally, we suppressed all results derived from table cells with less than 30 un-weighted respondents [34].

For multivariate analyses, standardized sample weights were used to preserve the original sample size, avoiding an overestimation of significance while maintaining the same distributions as those obtained when using population weights [41]. SAS software was used for all analyses [42].

Results

Demographics/characteristics

In 2005, 22,071 respondents between the ages of 15 and 75 reported working in the past year. Among those, 20,661 completed the social support questions. These respondents represent 4,507,273 Canadians.

Table 1 shows a comparison of study population characteristics by the three categories of workplace social support. Those who reported low workplace social support also reported female gender, poor self-rated health, depression, smoking attempts, less job satisfaction, more job insecurity, and high authority and psychological demands at work (Table 1).

Table 2 shows the overall prevalence of work-related RSI and SI by demographic, injury and workplace social support characteristics.

	Repetitive Strain Injury (RSI)*			Serious Injury (SI)*		
	At work (n=298,800)	Not at work (n =180,000)	No RSI (n =4,028,500)	At work (n=155,700)	Not at work (n=410,800)	No SI (n=3,940,700)
Characteristic	%	%	%	%	%	%
Age						
15-24	10.8	23.6	20.0	19.3	33.7	18.1
25-34	19.6	15.8	21.3	27.3	19.4	20.9
35-44	27.6	21.2	23.4	25.4	21.9	23.6
45-54	30.0	25.9	22.1	17.8	17.9	23.5
55-64	10.9	12.8	11.5	9.4	6.2	12.1
65-74	Suppressed	Suppressed	1.7	Suppressed	Suppressed	1.7
Gender						
Male	53.6	56.1	53.3	73.6	58.5	52.3
Female	46.4	40.9	46.7	26.4	41.6	47.7
Nature of Injury						
Fracture/dislocation /sprain				54.2	61.4	
Burn	-	-	-	6.0	3.2	-
Cut/bruise				18.8	14.4	
Concussion/internal				Suppressed	2.1	
Other				18.2	17.4	
Part of Body Injured						
Head or Neck	4.8	Suppressed		10.0	7.4	
Upper extremities	65.0	49.8		38.4	28.8	
Lower extremities	4.6	24.7	-	25.8	43.8	-
Back	23.1	15.6		22.3	13.5	
Other (for RSI)	2.5	7.3		-	-	
Trunk (for SI)	-	-		Suppressed	4.6	
Worker social support						
High	43.0	54.0	53.0	51.3	49.5	52.7
Medium	50.1	42.3	43.8	45.0	47.1	43.8
Low	6.9	3.6	3.2	3.7	3.5	3.5

* The number of workers is weighted and values are rounded to the nearest 100; the total un-weighted n = 20,661
Percentages are adjusted for missing data and may not total to 100 due to rounding.

Table2: Prevalence of work-related repetitive strain and serious injury by basic demographics, injury characteristics, and worker social support, for workers responding to the CCHS, (2005).

Those reporting work-related RSI reported double the prevalence of workplace social support compared to those with a RSI outside of work or those without a RSI. Similar levels of workplace social support were reported for all categories of SI and the working population with no SI (Table 2).

Association between worker social support and work-related injury

Workplace social support was significantly associated with work-related RSI in both genders when comparing injured to non-injured individuals (table 3). Males reporting medium or high workplace social support were approximately 35% (95% CI: 2%-57%) less likely to report a RSI at work than those reporting low social support when compared to non-injured workers. Females reporting high workplace social support were 55% (95% CI: 37%-68%) less likely to report a RSI at work than females reporting low workplace social support. When comparing work-related to non-work-related RSI, all important associations disappeared except for females reporting high workplace social support, who were 64% (95% CI: 14%-85%) less likely to report a RSI than females reporting low workplace social support (Table 3).

Workplace social support was not associated with work-related SI using either comparison group (Table 4).

Discussion

We hypothesized that workers reporting high workplace social support would be less likely to experience work-related injury. We found that workers reporting high workplace social support were less likely to report work-related RSI, but not SI. Findings between the two comparison groups were similar. In the RSI analyses, associations were only found when work-related injury was compared to non-injured individuals and not the non-work-related RSI group.

Strengths and weaknesses

There were three strengths of this study. First, data were collected from a large, nationally representative sample of the Canadian population. Second, an injured and a non-injured comparison group were used to assess unmeasured "risky behavior" or proneness to injury that may exist in injured individuals. Finally, the dataset contained a large number of covariates assessed for extraneous influences on the association.

Worker Social Support	Work-related Repetitive Strain Injury (RSI)							
	Control Group 1: RSI not at work				Control Group 2: No RSI			
	Male		Female		Male		Female	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Crude model[a]								
Low	1	(ref)	1	(ref)	1	(ref)	1	(ref)
Medium	0.79	0.44-1.40	0.49	0.26-0.92	0.60	0.42-0.68	0.49	0.36-0.66
High	0.60	0.35-1.10	0.27	0.14-0.50	0.48	0.34-0.68	0.30	0.22-0.41
Final model[b]								
Low	1	(ref)	1	(ref)	1	(ref)	1	(ref)
Medium	0.71	0.37-1.37	0.71	0.30-1.70	0.66	0.44-0.98	0.63	0.46-0.88
High	0.72	0.38-1.40	0.36	0.15-0.86	0.64	0.43-0.96	0.45	0.32-0.63

CI: confidence interval; OR: odds ratio
* Based on logistic regression using standardized sample weights
a Bivariate analysis
b Multivariable analysis including only true confounding variables:
- Males, control 1: decision authority, work status, student, and income
- Male, control 2: self-rated health, job satisfaction, psychological demands, work status, income
- Females, control 1: age, BMI, physical activity, job satisfaction, decision authority, physical exertion, work status, income
- Females, control 2: BMI, depression, job satisfaction, decision authority, work insecurity, physical exertion

Table 3: Crude and Adjusted Odds Ratios for Work-related repetitive Strain Injury and Worker Social Support*.

Worker Social Support	Work-related Serious Injury (SI)			
	Control Group 1: SI not at work		Control Group 2: No SI	
	OR	95% CI	OR	95% CI
Crude model[a]				
Low	1	(ref)	1	(ref)
Medium	0.90	0.57-1.43	0.95	0.64-1.43
High	0.98	0.62-1.55	0.90	0.60-1.35
Final model[b]				
Low	1	(ref)	1	(ref)
Medium	0.72	0.42-1.24	1.10	0.69-1.71
High	0.86	0.50-1.47	1.12	0.71-1.75

CI: confidence interval; OR: odds ratio
* Based on logistic regression using standardized sample weights
a Bivariate analysis
b Multivariable analysis including only true confounding variables C
- Control 1: job satisfaction, work status, student, income
- Control 2: job satisfaction, work status

Table 4: Crude and Adjusted Odds Ratios for Work-related Serious Injury and Worker Social Support*.

Some limitations were present in this study. First, the cross-sectional nature of the analysis precludes comment on the causal nature of the association. Second, all measures used in these analyses were self-reported. Respondents may over or underestimate self-reported measures of health depending on the variable of interest [43]. We expect our estimates to be conservative as this misclassification would be non-differential in nature. Third, the workplace social support questions related to the main job during the past year. Misclassification may occur if the injury occurred at a secondary job rather than the main job. However, we would also expect this misclassification to be non-differential as we would not expect responses on the injury questions to be dependent on the workplace social support responses. Fourth, we could only measure individual-level social support which is a function of interpersonal relationships, no measure of organizational policies were included in the CCHS. Finally, the reported injuries were severe enough to limit normal activities. Therefore, less severe injuries are excluded from analyses.

Role of "risky behaviors"

We included an injured comparison group to identify unmeasured behavioral influences on the relationship between workplace social support and work-related injury. Our findings did not indicate any unmeasured influences. In both the RSI and SI analyses, the injured and non-injured comparison groups reported similar levels of workplace social support (Table 2). The slight differences in the results between the two comparison groups are due to differential age and gender distributions across control groups. There were more males in the injured comparison group than in the non-injured group for both RSI and SI analyses (Table 2). The RSI comparison group also had greater proportions in the youngest and oldest age categories compared to the non-injured group, while the seriously injured outside of work comparison group was much younger than the non-injured group.

Comparison with previous studies

Three systematic reviews suggest that workplace social support may increase the risk for workplace injury independent of other psychosocial factors [10,20,26]. Ariëns et al. found evidence for a positive association between neck pain and low co-worker social support [26]. Bongers et al. found 33% to 56% of studies identifying low social support as a risk factor for work-related pain (OR varied from 1.2-2.1) [20]. Hoogendoorn et al. found strong evidence for a positive association between low social support in the workplace and nonspecific low back pain [10]. The magnitude of the risk estimates ranged from 1.3 to 1.9. Our study, also including a measure of social disengagement, found a similar magnitude of association. Other studies using worker social engagement also found positive associations [21,22].

The methodological problem with studies of workplace social support is that social support is rarely considered the main exposure of interest, hence lack of control for important confounding variables. Control for appropriate confounders cannot be achieved through prediction rather than etiological studies. A good example is Cole et al. since their study population and measure of individual social support is similar to this study [33]. However, as social support was not their main exposure of interest, they excluded it entirely from multivariate analyses such that no adjusted measure of association can be determined from their study. Our study remedies this problem by focusing on workplace social support as the main exposure of interest. Confounding factors are established based on this main association of interest instead of inserting only significant bivariate variables into a prediction equation. This is likely for why we found a significant association with RSI while Cole et al. did not.

Future research examining the association between social support in the workplace and work-related injury should focus on etiologic longitudinal studies with multi-level analyses. Prospective research designs are necessary to establish causality of the association and proper control for confounding factors will delineate the true association.

In conclusion, this study provides evidence for an association between individual worker social support and RSI at work, but not serious injury at work. Future studies need to address the methodological limitations that plague the existing literature.

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