

Work stress and health

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Abstract

Objectives

This article describes work stress experienced by the employed population. It examines associations between job strain, job insecurity, physical demands, low co-worker support and low supervisor support, and four health outcomes: migraine, work injury, high blood pressure and psychological distress.

Data source

The data are from the household component of the 1994/95 National Population Health Survey conducted by Statistics Canada. Results are based on a sample of 9,023 employed Canadians aged 18 to 64.

Analytical techniques

Multivariate analyses were used to estimate associations between work stress and health problems, while controlling for other potential stressors.

Main results

Among men, job strain was associated with migraine and psychological distress, and among women, with work injury. Job insecurity was associated with migraine among women. High physical demands were related to work injury in both sexes. Low co-worker support was related to migraine among men, and to work injury and psychological distress among women.

Key words

occupational health, job strain, hypertension, migraine, occupational injury

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In today's rapidly changing labour market, the consequences of stress in the workplace have become an issue. Previous studies have suggested that adverse work conditions are related to a variety of health problems. Research has focused on associations between factors such as work organization, job control and worker support, and health outcomes such as depression, anxiety, high blood pressure and coronary heart disease.¹⁻³

Job strain, defined as a measure of the balance between the psychological demands of a job and the amount of control or decision-making power it affords, has been proposed as a key component of work stress.⁴ Workers in high-strain jobs have been shown to have higher rates of a wide variety of diseases than their counterparts in low-strain jobs.⁵ Job strain, however, is only one element of work stress. Job insecurity, physical demands, and the amount of support provided by supervisors and co-workers also come into play in the work stress-illness relationship.

Methods

Data source

The analysis in this article is based on data from the household component of Statistics Canada's 1994/95 National Population Health Survey (NPHS) for the 10 provinces. This component of the NPHS sample consisted of 27,263 households, of which 88.7% agreed to participate. After applying a screening rule (to keep the sample representative),⁶ 20,725 households remained in scope.

In each household, one person was randomly selected to provide detailed information about his or her own health. The response rate to these questions was 96.1%, or 17,626 respondents. The data base containing this in-depth health information is called the Health file.

Data provided by 9,023 adults (4,709 men and 4,314 women) aged 18 through 64 who were employed at the time of the survey and who answered questions pertaining to work stress were analyzed for this article. These data were weighted using the age and sex distribution of the Canadian population to represent nearly 12.8 million people.

Analytical techniques

All analyses are based on weighted data. Descriptive statistics were used to profile the population who were working at the time of the survey (Appendix Table A). The average values for five measures of work stress (job strain, job insecurity, physical demands, co-worker support and supervisor support) and the prevalence of four health outcomes (migraine, work injury, high blood pressure and psychological distress) were calculated by sex and occupational category (see *Measures of work stress and Health outcomes*). Multiple logistic regression was used to model the relationship between work stress and work injury, migraine, and high blood pressure. Multiple linear regression was used to model the relationship of work stress to psychological distress. Separate regression models were fitted for men and women. Coefficients of variation and standard errors were estimated using a weighted bootstrap procedure that fully accounts for the design effect of the survey.

Based on face validity and availability from the NPHS, selected stress-related factors were included in the regression models as control variables.⁷ Work-related variables were occupation and employment status. Personal characteristics included age, marital status, educational attainment, household income and presence of children younger than age 12 in the household. Health behaviours comprised smoking status and level of energy expenditure in recreational activities. Psychological variables were recent negative

life events, chronic strain, lack of closeness and sense of mastery (see *Measures of socioeconomic characteristics and health behaviours* and *Measures of stress and psychological resources*).

Limitations

Questions about work stress were asked only of people who were currently employed and able to go to work. No information was provided about individuals whose health problems or work injuries were serious enough to prevent them from working at the time of the survey. Therefore, the observed relationship between work stress and health outcomes is likely weaker than it would be if those who were not able to work because of injury or illness had been included.

It is well known that response to stress varies across individuals. Information on individual tolerance to particular stressors is not available from the NPHS. This may affect the observed relationships between the work stress variables and the selected health outcomes.

Cronbach's alpha was used to assess the internal consistency of the work stress indices that were measured by at least two items. The internal consistency estimate was 0.34 for psychological demands of work, 0.61 for decision latitude, and 0.22 for support from co-workers. Previous studies^{8,9} based on Karasek's Job Content Questionnaire,¹⁰ which contains 5, 8 and 4 items respectively for these scales, have reported internal consistency estimates of 0.7 or above for all three scales. The relatively low estimates of internal consistency found here are in part due to the limited number of items available from the NPHS to measure work stress. Likewise, the occurrence of fewer associations than expected between work stress and the selected health indicators might also be partly attributable to the low number of items.

No information is available on the timing of diagnosis or on the severity of chronic conditions. To minimize the reporting error related to chronic conditions (in this analysis, high blood pressure and migraine), respondents were instructed to report only conditions that were, or that were expected to be, of at least six months' duration, and that had been diagnosed by a health professional.

The NPHS data impose some limitations on the interpretation of the results. Because the data are cross-sectional, causality cannot be inferred from the observed associations. The data are also self-reported, so individual differences in perception may influence their accuracy.

Although its impact is important, work generates only part of an individual's total stress. In addition to stressors on the job, workers may experience home, social and individual situations that contribute to their stress levels.⁷ However, many recent reports on the health effects of work stress are confined to job strain.^{1,11-16} An important exception is provided in a study by Karasek, Gardell and Lindell, which takes into account the influence of family life as well as the work environment.¹⁷

Using data from the 1994/95 National Population Health Survey (NPHS), this article describes levels of work stress among employed Canadians, and highlights some differences among occupational categories and between the sexes. It also examines associations between selected health conditions and work stress, taking into account the influence of

factors originating outside the workplace (see *Methods*). Four health outcomes are considered: work injury, migraine, high blood pressure and psychological distress. Although numerous articles have focused on associations between work stress and specific health problems, including high blood pressure and psychological distress, this is the first to examine the relationship of work stress to work injury and migraine.

Work stress among occupational groups

Men and women differ significantly on a number of work stress dimensions (Table 1) (see *Measures of work stress*). In 1994/95, on average, women reported a higher level of job strain. This is consistent with other research showing that men

Measures of work stress

To measure *work stress*, the 1994/95 National Population Health Survey (NPHS) asked participants to rank their responses to the following 12 statements using a five-point scale ranging from "strongly agree" (a score of 1) to "strongly disagree" (a score of 5).

- a) Your job requires that you learn new things (reverse scored).
- b) Your job requires a high level of skill (reverse scored).
- c) Your job allows you freedom to decide how you do your job (reverse scored).
- d) Your job requires that you do things over and over.
- e) Your job is very hectic (reverse scored).
- f) You are free from conflicting demands that others make.
- g) Your job security is good.
- h) Your job requires a lot of physical effort (reverse scored).
- i) You have a lot to say about what happens in your job (reverse scored).
- j) You are exposed to hostility or conflict from the people you work with (reverse scored).
- k) Your supervisor is helpful in getting the job done.
- l) The people you work with are helpful in getting the job done.

Five components of work stress were assessed:

1) *Job strain*, measured as a ratio of psychological demands (items e and f) to decision latitude. Items pertaining to decision latitude include skill discretion (a, b and d) and decision authority (c and j).

So that the potential contribution of each item to the scores for decision latitude and psychological demands would be equal, the summed scores of the responses to the items pertaining to each were divided by 5 and 2, respectively. The ratio for job strain was then calculated by dividing the new score for psychological demands by that for decision latitude. For values of the ratio that fall in the upper quartile of the distribution (scores equal to or greater than 1.18), the respondent was categorized as being in a high-strain job.

2) *Job insecurity*, measured by item g. Respondents who answered "neither agree nor disagree," "disagree," or "strongly disagree" were categorized as experiencing job insecurity (29%).

3) *Physical demands*, measured by item h. Respondents who answered "strongly agree" or "agree" (41%) were categorized as experiencing high physical demands.

4) *Co-worker support*, measured by items j and l. Responses to the items were summed, yielding a range of 1 to 10. Respondents with a score of greater than or equal to 7 were considered to have low support (27%).

5) *Supervisor support*, measured by item k. Respondents who answered "strongly disagree" or "disagree" were categorized as receiving low support from their supervisor (32%).

report having more job control than do women.¹⁸ And, to some extent, it may reflect differences in the types of occupations in which men and women are employed (Appendix Table A).^{5,19} As well, women tended to report less support from co-workers than men did. On the other hand, men reported a higher level of physical demands and less support from supervisors. The average scores for job insecurity did not differ significantly between men and women.

For both sexes, work stress scores tended to be relatively high in service and blue-collar occupations, but low in the administrative and professional categories (Table 2 and Appendix Table B). These findings corroborate earlier Canadian research,²⁰ which concluded that workers' reactions to their jobs are determined by the nature of the jobs themselves, rather than by the workers' sex.

Men in blue-collar occupations had significantly higher average levels of physical demands than those in other occupational groups. Average levels of physical demands were also high for men in clerical and service occupations, compared with those in administrative, professional or sales positions. However, men in sales experienced high physical demands compared with those in administrative or professional occupations. Job strain was high for men in clerical, sales and service occupations, compared with those in professional positions. As well, men in service occupations experienced significantly high job strain relative to administrative or blue-collar workers. And compared with male clerical workers, men in administration and services had low supervisor support. Job insecurity and co-worker support did not differ significantly among men in various occupational groups.

Women in service and in blue-collar occupations had on average significantly higher levels of job strain and physical demands, relative to women in most other occupational groups. Women in service occupations also scored low on supervisor support, compared with those in professional or blue-collar jobs. Physical demands were high for women in professional and sales positions, relative to those in administrative or clerical jobs. The high scores for the professional group may be influenced by women

Table 1
Average score on work stress dimensions, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Both sexes	Men	Women
Job strain†	0.99	0.95	1.04 *
Job insecurity†	2.37	2.34	2.40
Physical demands†	3.08	3.19*	2.94
Co-worker support‡	3.62	3.58	3.68 *
Supervisor support‡	2.40	2.43*	2.35

Data source: 1994/95 National Population Health Survey, Health file

† Coded low to high

‡ Coded high to low

* Average score is significantly different compared with other sex ($p = 0.05$). Standard errors used in the calculations of the confidence intervals were estimated with the bootstrap technique.

Measures of socioeconomic characteristics and health behaviours

To establish *marital status*, respondents were asked "What is . . . current marital status?" Those who chose the "now married," "common-law" or "living with a partner" options were grouped together as "married." Individuals who answered "single" were classed as "never married," and "widowed," "separated" and "divorced" were categorized as "previously married."

Respondents were grouped into five *educational attainment* categories: less than secondary graduation; secondary graduation; some postsecondary; college, trade or university graduation; and not stated.

Household income was based on total household income and the number of people in the household:

People in household	Household income group				
	Lowest	Lower-middle	Middle	Upper-middle	Highest
1 or 2	<\$10,000	\$10,000- \$14,999	\$15,000- \$29,999	\$30,000- \$59,999	≥\$60,000
3 or 4	<\$10,000	\$10,000- \$19,999	\$20,000- \$39,999	\$40,000- \$79,999	≥\$80,000
5 or more	<\$15,000	\$15,000- \$29,999	\$30,000- \$59,999	\$60,000- \$79,999	≥\$80,000

Occupations were categorized as administrative, professional, clerical, sales, service, blue-collar, and not stated.

Employment status was classed as full-time (30 or more hours per week) or part-time (less than 30 hours per week), or not stated.

Respondents were asked about *smoking*. Their answers were grouped into five categories: daily; former; occasional; never; and not stated.

Levels of *recreational physical activity* were defined (based on energy expenditure) as low, moderate, high or not stated.

working in nursing and teaching, both of which can be physically demanding. Average levels of job strain were high for women in clerical positions, compared with those in administrative or professional occupations. As with men, job insecurity and support from co-workers did not differ significantly among women in the different occupational groups.

Health problems

Previous studies have shown a number of physical and emotional health problems to be related to the work environment.^{5,8,13,16,17,21-32} This analysis examines four conditions in relation to work stress: work injuries, migraine, high blood pressure and psychological distress. According to the 1994/95

Table 2
Significant differences in dimensions of work stress, by occupation and sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Men						Women					
	Occupation						Occupation					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
(X indicates that the mean of the occupational group listed in the row is significantly higher than the mean of the occupational group listed in the column)												
Administrative (1)												
Job strain [†]					
Job insecurity [†]					
Physical demands [†]					
Co-worker support [‡]					
Supervisor support [‡]	...		X				...					
Professional (2)												
Job strain [†]					
Job insecurity [†]					
Physical demands [†]		...					X	...	X			
Co-worker support [‡]				
Supervisor support [‡]				
Clerical (3)												
Job strain [†]		X	...				X	X	...			
Job insecurity [†]				
Physical demands [†]	X	X	...	X			...	...	...
Co-worker support [‡]			
Supervisor support [‡]			
Sales (4)												
Job strain [†]		X	...									...
Job insecurity [†]	
Physical demands [†]	X	X	...				X		X			...
Co-worker support [‡]
Supervisor support [‡]
Service (5)												
Job strain [†]	X	X			...	X	X	X		X		...
Job insecurity [†]
Physical demands [†]	X	X		X	...	...	X	X	X	X		...
Co-worker support [‡]
Supervisor support [‡]	X		...	...		X			...	X
Blue-collar[§] (6)												
Job strain [†]						...	X	X		X		...
Job insecurity [†]					
Physical demands [†]	X	X	X	X	X	...	X	X	X	X		...
Co-worker support [‡]
Supervisor support [‡]

Data source: 1994/95 National Population Health Survey, Health file
Note: Tests with p values equal to 0.003 (instead of 0.05) were considered significant to account for the multiple comparisons. Standard errors were estimated with the bootstrap technique. (See Appendix Table B for average scores on components of work stress.)
[†] Coded low to high
[‡] Coded high to low
[§] Includes primary, processing/machining, product fabricating, and construction occupations.
 ... Not applicable

NPHS, the prevalence of these problems varied between male and female workers, and among occupations (Table 3). However, because the data are not age-adjusted, some of the differences in prevalence may be related to the age of the workers in the occupational categories.

The proportion of men who had sustained a work-related injury considerably exceeded that for women: 9% compared with 5%. Work injuries among men were most common in blue-collar occupations. For women, work injuries were most prevalent in service occupations.

Unlike work injuries, migraine afflicted a larger proportion of women than men. The percentage of female workers reporting migraine (12%) was triple that for men (4%). People in administrative jobs, both men and women, were the most likely to report migraine.

Health outcomes

The following question was used to measure *chronic conditions*: "I'd like to ask about any chronic health conditions . . . may have. 'Long-term conditions' refers to conditions that have lasted or are expected to last 6 months or more. Does . . . have any of the following long-term conditions that have been diagnosed by a health professional?" The list included high blood pressure and migraine.

To measure *work injuries*, respondents were asked two "yes/no" questions: "In the past 12 months, did . . . have any injuries that were serious enough to limit your/his/her normal activities?" and "Was this a work-related injury?"

To measure *psychological distress*, respondents answered six questions related to symptoms of depression and anxiety, ranked on a five-point scale from "none of the time" to "all of the time":

"During the past month, about how often did you feel . . .

- so sad that nothing could cheer you up?"
- nervous?"
- restless or fidgety?"
- hopeless?"
- worthless?"
- that everything was an effort?"

The responses to all items were summed; higher scores indicated more distress (Cronbach's alpha = 0.77). Respondents with a score that fell in the upper quartile of the distribution were considered to be experiencing high psychological distress.

About 5% of both male and female workers reported high blood pressure. The prevalence of high blood pressure did not differ significantly across occupational groups.

Consistent with the findings of a recent Quebec study,²⁴ the NPHS shows higher levels of psychological distress among female than male workers. The women with the highest average psychological distress score worked in service

Table 3
Prevalence of selected health problems, by occupation and sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Work injury in past 12 months	Migraine	High blood pressure	Psychological distress score
	%	%	%	average
Men				
Total	9	4	5	2.97
Administrative	2 [†]	7	6	2.83
Professional	4	5	4	2.85
Clerical	--	--	5 [‡]	3.61
Sales	5 [‡]	--	4 [‡]	2.93
Service	7	4 [‡]	5	3.48
Blue-collar [†]	13	3	4	2.85
Women				
Total	5	12	5	3.50
Administrative	--	14	4	3.38
Professional	6	12	4 [‡]	3.22
Clerical	3	11	5	3.48
Sales	--	12	4 [‡]	3.48
Service	7	13	5	3.92
Blue-collar [†]	6	10	7 [‡]	3.60

Data source: 1994/95 National Population Health Survey, Health file

[†] Includes primary, processing/machining, product fabricating, and construction occupations.

[‡] Coefficient of variation between 25.1% and 33.3%

-- Coefficient of variation greater than 33.3%

Table 4
Percentage of workers reporting high psychological distress, by job decision latitude and job demands, employed population aged 18 to 64, Canada excluding territories, 1994/95

Job demands	Job decision latitude			
	High	Moderate	Low	Very low
	% with high psychological distress score [†]			
High	27	33	33	40
Moderate	24	26	30	35
Low	19	20	21	30
Very low	16	18	22	20

Data source: 1994/95 National Population Health Survey, Health file

[†] Upper quartile of the distribution

occupations; women in professional occupations had the lowest.

Among men, the average level of psychological distress was highest in clerical positions, higher, in fact, than for women in this category. The male workers with the lowest average psychological distress scores were in administrative occupations, although scores in professional and blue-collar occupations were almost as low.

Psychological distress tended to be high among workers in jobs with high demands, but little latitude

for decision-making. Fully 40% of workers in such jobs scored high on psychological distress (Table 4). Among those in high-demand jobs who had considerable decision latitude, the proportion experiencing high psychological distress was a much lower 27%. Not surprisingly, workers in jobs with very low demands were least likely to report high levels of psychological distress. Yet even in these jobs, the percentage with high distress generally increased as decision latitude declined.

Measures of stress and psychological resources

To measure *recent negative life events*,³³⁻³⁵ the NPHS asked respondents 10 "yes/no" questions. Individuals who reported one or more such events (38%) were categorized as having experienced this kind of stress.

- "In the past 12 months, were you (or was anyone close to you—that is, your spouse or partner, children, relatives or close friends) beaten up or physically attacked?"
- "In the past 12 months, did you or someone in your family have an unwanted pregnancy?"
- "In the past 12 months, did you or someone in your family have an abortion or miscarriage?"
- "In the past 12 months, did you or someone in your family have a major financial crisis?"
- "In the past 12 months, did you or someone in your family fail school or a training program?"
- "In the past 12 months, did you (or your partner) experience a change of job for a worse one?"
- "In the past 12 months, were you (or your partner) demoted at work or did you/either of you take a cut in pay?"
- "In the past 12 months, did you have increased arguments with your partner?"
- "Now, just you personally, in the past 12 months, did you go on welfare?"
- "In the past 12 months, did you have a child move back into the house?"

*Chronic strain*³⁶ was measured by asking respondents to reply "true" or "false" to 11 statements:

- "You are trying to take on too many things at once."
- "There is too much pressure on you to be like other people."
- "Too much is expected of you by others."
- "You don't have enough money to buy the things you need."
- "Your work around the home is not appreciated."
- "Your friends are a bad influence."

- "You would like to move but you cannot."
- "Your neighbourhood or community is too noisy or too polluted."
- "You have a parent, a child or partner who is in very bad health and may die."
- "Someone in your family has an alcohol or drug problem."
- "People are too critical of you or what you do."

A score of 1 was assigned to each "true" response. High chronic strain was defined as a score of 2 to 11 (60%).

Lack of closeness was assessed with two "true/false" statements: one for people who were married, living with a partner or in a common-law union, and one for people who were single, widowed, divorced or separated. Those who responded "true" (20%) were categorized as lacking closeness.

- "Your partner doesn't understand you."
- "You find it is very difficult to find someone compatible with you."

To measure *mastery*,³⁷ respondents were asked to react to seven items, which were ranked on a five-point scale ranging from "strongly agree" (0) to "strongly disagree" (4). (The coding on the last two items was reversed.)

- "You have little control over the things that happen to you."
- "There is really no way you can solve some of the problems you have."
- "There is little you can do to change many of the important things in your life."
- "You often feel helpless in dealing with problems of life."
- "Sometimes you feel that you are being pushed around in life."
- "What happens to you in the future mostly depends on you."
- "You can do just about anything you really set your mind to."

The responses to all items were summed (ranging from 0 to 28) and higher scores indicated superior mastery (Cronbach's alpha = 0.76). Respondents with total scores of less than 20 were categorized as having low mastery (39%).

Health problems and work stress

Health problems are related to many conditions and situations that have little to do with stress, such as age, education and physical activity. Nonetheless, even when the effects of a number of such variables were taken into account, several dimensions of work stress were significantly associated with specific health outcomes (Table 5).

Among men, job strain was significantly related to migraine and psychological distress (Appendix Tables C and D). Among women, job strain was significantly associated with work injury, even though people whose injuries were serious enough to keep them from employment were excluded from the analysis. Therefore, the calculated odds ratio likely underestimates the true strength of association (Appendix Table E). Although a number of studies have reported an association between job strain and high blood pressure,^{8,11,23,24,32,38} such a relationship was not observed in the NPHS data for either sex (see *Methods*).

After other potentially confounding factors were taken into account, job insecurity was associated with

migraine among women. This is consistent with the medical literature, which suggests a link between emotional stress and migraine.³⁹

As might be expected, high physical demands on the job were associated with work injury for both sexes. Previous research has also reported associations between physically demanding jobs and various musculoskeletal problems, usually involving the back or neck.²⁵⁻²⁹

Some interpersonal aspects of the work setting appear to adversely affect workers' health. Men with low support from their co-workers had significantly high odds of suffering from migraine. Among women, low support from co-workers was linked to psychological distress and increased the odds of work injury (Table 5 and Appendix Tables C, D and E).

Researchers have theorized that social support buffers psychological stress at work, reducing adverse health outcomes.^{17,18,30,31} One previous study reported that a modifying effect of work control on job demand was observed only when co-worker support was present;¹³ it did not find an association

Table 5
Adjusted odds ratios and regression coefficients relating work stress dimensions to health outcomes, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

Work stress dimensions	Work injury in past 12 months		Migraine		High blood pressure		Psychological distress [†]	
	Odds ratio	95% confidence interval [‡]	Odds ratio	95% confidence interval [‡]	Odds ratio	95% confidence interval	Unstandardized coefficient (b)	95% confidence interval [§]
Men								
High job strain	1.2	0.8, 1.7	1.6 *	1.0, 2.6	0.9	0.6, 1.5	0.63 *	0.28, 0.99
High job insecurity	1.1	0.8, 1.7	1.4	0.9, 2.2	1.0	0.7, 1.5	-0.05	-0.14, 0.05
High physical demands	3.3 *	2.3, 4.8	0.8	0.5, 1.4	1.0	0.6, 1.6	-0.02	-0.11, 0.06
Low co-worker support	1.2	0.8, 1.6	1.5 *	1.0, 2.3	1.1	0.7, 1.7	0.03	-0.04, 0.11
Low supervisor support	0.9	0.7, 1.3	1.0	0.7, 1.5	0.8	0.5, 1.1	0.01	-0.09, 0.10
Women								
High job strain	1.2 *	1.0, 1.4	1.1	0.8, 1.5	1.4	0.8, 2.3	0.05	-0.31, 0.42
High job insecurity	1.7	0.7, 4.0	1.4 *	1.0, 1.8	0.8	0.5, 1.3	0.02	-0.09, 0.13
High physical demands	1.9 *	1.7, 2.1	1.1	0.9, 1.5	1.0	0.6, 1.6	-0.02	-0.12, 0.09
Low co-worker support	1.8 *	1.7, 1.8	1.2	0.9, 1.6	0.9	0.6, 1.4	0.08 *	0.00, 0.16
Low supervisor support	1.1	1.0, 1.3	1.1	0.8, 1.4	0.9	0.6, 1.4	-0.09	-0.20, 0.02

Data source: 1994/95 National Population Health Survey, Health file

Note: See Appendix Tables C through F for information on all variables included in the models.

[†] In modelling psychological distress, the variables job strain, job insecurity and physical demands were coded low to high; co-worker support and supervisor support were coded high to low.

[‡] Because of rounding, some confidence intervals with 1.0 as the lower limit were significant.

[§] Because of rounding, some confidence intervals with 0 as the lower limit were significant.

* $p = 0.05$

with support from one's supervisor. Similarly, this analysis of NPHS data found no significant relationship between supervisor support and the four health problems examined, possibly because only one item was available to measure this dimension.

Negative life events and other stressors

Other research suggests that experiencing one or more recent negative life events can independently influence susceptibility to a variety of health problems.⁴⁰ The NPHS, too, shows negative life events to be fairly consistently associated with health problems (the exception was work injury) (Appendix Tables C, D and F). For both sexes, such events were associated with migraine and psychological distress. Among men, an association with high blood pressure was revealed.

Individual characteristics, along with the home and social environments, seem to be more strongly associated with psychological distress than with any of the other three health problems examined. For both sexes, chronic strain, lack of closeness and a low sense of mastery were associated with psychological distress. While the association of these emotional and social factors with psychological distress is not surprising, it is noteworthy that each remained independently and simultaneously associated after other variables that might have had an effect were taken into account.

The literature on the effects of parenthood on working women is contradictory and inconclusive. The NPHS finding that having one or more children under age 12 was associated with low psychological distress in women is consistent with some, but not all, previous reports.^{17,41}

Concluding remarks

This analysis of the relationship between health and work stress controls for a greater range of potentially confounding variables outside the workplace than are usually reported. The lower-than-expected number of associations between work stress and health problems can be partly attributed to the lack of information on the timing of diagnosis and the severity of illness. Nonetheless, there is evidence

of a weak to moderate relationship between work stress and some health outcomes.

Workers who experienced job strain, job insecurity, physical demands or low support from their co-workers reported physical and emotional health problems. Of course, it is not possible to know from this cross-sectional study whether the work environment has adverse health effects, or whether workers with specific health problems are more susceptible to workplace stress. ●

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Appendix

Table A

Characteristics of employed population aged 18 to 64, Canada excluding territories, 1994/95

	Both sexes		Men		Women	
	Number ('000)	%	Number ('000)	%	Number ('000)	%
Total	12,760	100.0	7,086	100.0	5,672	100.0
Occupation						
Administrative	1,845	14.5	1,120	15.8	725	12.8
Professional	2,298	18.0	970	13.7	1,329	23.4
Clerical	1,884	14.8	470	6.6	1,413	24.9
Sales	1,041	8.2	524	7.4	516	9.1
Service	1,638	12.8	698	9.8	940	16.6
Blue-collar†	3,641	28.5	3,075	43.4	566	10.0
Not stated	413	3.2	230	3.2	184	3.2
Employment status						
Full-time	10,724	84.0	6,522	92.0	4,202	74.1
Part-time	1,990	15.6	531	7.5	1,459	25.7
Not stated	46	0.4	33	0.5	12	0.2
Age						
18-24	1,599	12.5	843	11.9	756	13.3
25-34	3,630	28.4	1,978	27.9	1,651	29.1
35-44	3,818	29.9	2,124	30.0	1,694	29.9
45-54	2,633	20.6	1,524	21.5	1,109	19.5
55-64	1,080	8.5	617	8.7	462	8.2
Marital status						
Married	8,904	69.8	5,068	71.5	3,836	67.6
Never married	2,827	22.2	1,624	22.9	1,203	21.2
Previously married	1,025	8.0	394	5.6	631	11.1
Not stated	4	—	1	—	3	0.1
Educational attainment						
Less than secondary graduation	2,052	16.1	1,307	18.4	746	13.1
Secondary graduation	2,150	16.8	1,169	16.5	981	17.3
Some postsecondary	3,426	26.8	1,803	25.4	1,623	28.6
College, trade or university graduation	5,117	40.1	2,798	39.5	2,319	40.9
Not stated	15	0.1	10	0.1	5	0.1
Household income group						
Lowest	401	3.1	186	2.6	215	3.8
Lower-middle	767	6.0	390	5.5	377	6.6
Middle	3,068	24.0	1,642	23.2	1,426	25.1
Upper-middle	5,317	41.7	3,001	42.3	2,317	40.8
Highest	2,639	20.7	1,510	21.3	1,129	19.9
Not stated	568	4.4	357	5.0	210	3.7
Child(ren) under age 12 in household						
Yes	4,437	34.8	2,463	34.8	1,974	34.8
No	8,323	65.2	4,623	65.2	3,699	65.2
Smoking						
Daily	3,451	27.0	2,054	29.0	1,397	24.6
Former/Occasional	4,456	35.0	2,552	36.0	1,904	33.6
Never	4,848	38.0	2,475	34.9	2,373	41.8
Not stated	5	—	5	0.1	—	—
Recreational physical activities						
Low	7,417	58.1	3,830	54.0	3,587	63.2
Moderate	2,700	21.2	1,518	21.4	1,182	20.8
High	2,045	16.0	1,246	17.6	799	14.1
Not stated	598	4.7	492	6.9	106	1.9
One or more recent negative life events						
No	7,316	57.3	4,062	57.3	3,254	57.4
Yes	4,817	37.8	2,510	35.4	2,307	40.7
Not stated	627	4.9	515	7.3	112	2.0
High chronic strain						
Yes	7,378	57.8	3,790	53.5	3,588	63.2
No	4,739	37.1	2,770	39.1	1,969	34.7
Not stated	643	5.0	526	7.4	117	2.1
Closeness						
Difficulty finding	2,419	19.0	1,250	17.6	1,168	20.6
No difficulty finding	9,694	76.0	5,312	75.0	4,382	77.2
Not stated	647	5.1	524	7.4	123	2.2
Sense of mastery						
Low	4,851	38.0	2,499	35.3	2,352	41.5
High	7,222	56.6	4,051	57.2	3,171	55.9
Not stated	687	5.4	536	7.6	151	2.7

Data source: 1994/95 National Population Health Survey, Health file

Note: Detail may not add to totals because of rounding.

† Includes primary, processing/machining, product fabricating, and construction occupations.

— Nil

Table B

Average scores on work stress dimensions, by occupation and sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Job strain [†]	Job insecurity [†]	Physical demands [†]	Co-worker support [‡]	Supervisor support [‡]
Men					
Administrative	0.92	2.20	2.36	3.57	2.56
Professional	0.90	2.32	2.45	3.52	2.38
Clerical	1.01	2.36	3.27	3.76	2.17
Sales	1.00	2.34	2.78	3.63	2.53
Service	1.02	2.33	3.49	3.77	2.54
Blue-collar [§]	0.94	2.39	3.78	3.51	2.41
Women					
Administrative	0.97	2.30	2.31	3.73	2.32
Professional	0.99	2.50	3.09	3.68	2.27
Clerical	1.05	2.32	2.34	3.59	2.39
Sales	0.98	2.44	2.88	3.51	2.25
Service	1.13	2.40	3.76	3.84	2.53
Blue-collar [§]	1.11	2.47	3.66	3.57	2.24

Data source: 1994/95 National Population Health Survey, Health file

Note: The scores for each component of work stress are based on different scales; therefore, they cannot be compared with one another.

[†] Coded from low to high

[‡] Coded from high to low

[§] Includes primary, processing/machining, product fabricating, and construction occupations.

Table C
Adjusted odds ratios relating selected characteristics to migraine, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Work stress				
High job strain [†]	1.6 *	1.0, 2.6	1.1	0.8, 1.5
High job insecurity [†]	1.4	0.9, 2.2	1.4 *	1.0, 1.8
High physical demands [†]	0.8	0.5, 1.4	1.1	0.9, 1.5
Low co-worker support [†]	1.5 *	1.0, 2.3	1.2	0.9, 1.6
Low supervisor support [†]	1.0	0.7, 1.5	1.1	0.8, 1.4
Occupation				
Administrative [‡]	1.0	...	1.0	...
Professional	0.7	0.4, 1.6	0.8	0.5, 1.3
Clerical	1.1	0.4, 3.0	0.8	0.5, 1.2
Sales	0.4	0.1, 1.5	1.0	0.6, 1.6
Service	0.7	0.3, 1.7	0.8	0.5, 1.4
Blue-collar [§]	0.5 *	0.2, 1.0	0.8	0.5, 1.5
Full-time employment[†]	1.0	0.4, 2.6	1.2	0.9, 1.6
Age				
18-24	2.8	0.2, 35.1	1.3	0.7, 2.8
25-34	1.8	0.2, 20.2	2.0 *	1.0, 4.0
35-44	3.9	0.3, 43.0	1.8	0.9, 3.5
45-54	3.8	0.3, 42.8	2.2 *	1.1, 4.1
55-64 [‡]	1.0	...	1.0	...
Marital status				
Married [‡]	1.0	...	1.0	...
Never married	1.0	0.4, 2.3	0.8	0.5, 1.2
Previously married	0.7	0.3, 1.9	1.2	0.8, 1.7
Child(ren) under age 12 in household[†]	1.3	0.8, 2.4	1.0	0.8, 1.4
Educational attainment				
Less than secondary graduation	1.2	0.6, 2.4	1.0	0.7, 1.6
Secondary graduation	1.0	0.5, 2.1	0.8	0.5, 1.2
Some postsecondary	1.3	0.7, 2.2	1.2	0.9, 1.6
College, trade or university graduation [‡]	1.0	...	1.0	...
Lowest, lower-middle, or middle household income group[†]	1.1	0.7, 1.9	0.8	0.6, 1.1
Smokes daily[†]	1.1	0.7, 1.7	1.1	0.9, 1.5
Recreational physical activities				
Low	1.2	0.7, 2.2	1.0	0.7, 1.4
Moderate	0.7	0.4, 1.5	1.1	0.7, 1.6
High [‡]	1.0	...	1.0	...
One or more recent negative life events[†]	2.1 *	1.3, 3.4	1.8 *	1.4, 2.4
High chronic strain[†]	1.3	0.8, 2.0	1.6 *	1.2, 2.2
Lack of closeness[†]	0.7	0.4, 1.3	0.7 *	0.5, 1.0
Low sense of mastery[†]	0.8	0.5, 1.2	1.0	0.7, 1.3

Data source: 1994/95 National Population Health Survey, Health file

Notes: Analysis is based on 4,172 men and 4,004 women. Approximately 13% of male respondents and 8% of female respondents with a missing value on one or more variables were excluded from the analysis. "Unknown" categories for occupation and income were included in the model to maximize the sample; however, their respective odds ratios are not shown. Confidence intervals are based on standard errors that were derived from the bootstrap technique for estimating the variance. Because of rounding, some confidence intervals with 1.0 as the lower or upper limit were significant.

[†] Reference category is absence of the characteristic; for example, the reference for high job strain is low job strain.

[‡] Reference category for which odds ratio is always 1.00

[§] Includes primary, processing/machining, product fabricating, and construction occupations.

* $p = 0.05$

... Figures not appropriate

Table D

Multivariate regression results predicting psychological distress from selected characteristics, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Men			Women		
	Unstandardized coefficient (b)	se	Standardized coefficient (beta)	Unstandardized coefficient (b)	se	Standardized coefficient (beta)
Work stress						
Job strain [†]	.63*	.18	.07*	.05	.19	.01
Job insecurity [†]	-.05	.05	-.02	.02	.05	.01
Physical demands [†]	-.02	.04	-.01	-.02	.05	-.01
Co-worker support [‡]	.03	.04	.02	.08*	.04	.04*
Supervisor support [‡]	.01	.05	.003	-.09	.05	-.03
Occupation						
Administrative ^{††}						
Professionals	-.07	.17	-.01	.17	.20	.02
Clerical	.29	.27	.02	-.09	.19	-.01
Sales	-.25	.22	-.02	-.17	.24	-.01
Service	-.15	.24	-.02	.10	.21	.01
Blue-collar [§]	-.36*	.16	-.06*	.01	.27	.001
Full-time employment	.02	.22	.002	-.06	.13	-.01
Age[†]	-.04*	.01	-.14*	-.04*	.01	-.12*
Marital status						
Married ^{††}						
Never married	.04	.16	.01	.29	.18	.04
Previously married	.34	.21	.03	.33	.19	.03
Child(ren) under age 12 in household	-.15	.13	-.02	-.34*	.14	-.05*
Educational attainment						
Less than secondary graduation	-.12	.17	-.02	.28	.22	.03
Secondary graduation	-.23	.14	-.03	-.23	.18	-.03
Some postsecondary	-.09	.12	-.01	.07	.14	.01
College, trade or university graduation ^{††}						
Lowest, lower-middle, middle household income group	-.02	.12	-.003	.12	.14	.02
Smokes daily	.13	.13	.02	.24	.14	.03
Recreational physical activities						
Low	.17	.12	.03	.10	.15	.01
Moderate	.18	.14	.03	.003	.17	.0004
High ^{††}						
One or more recent negative life events	.37*	.06	.13*	.31*	.06	.10*
Chronic strain[†]	.41*	.03	.25*	.39*	.04	.22*
Lack of closeness	.45*	.15	.06*	.65*	.17	.08*
Sense of mastery[†]	-.17*	.02	-.24*	-.21*	.01	-.27*
Intercept	6.3			7.3		
Total R²	.29			.29		

Data source: 1994/95 National Population Health Survey, Health file

Notes: Analysis is based on 4,166 men and 4,002 women. "Unknown" categories for occupation and income were included in the model to maximize the sample size; however, their respective b and beta coefficients are not shown. Approximately 11% of male respondents and 7% of female respondents were excluded from the analysis because of missing values. Standard errors were estimated with the bootstrap technique.

† Coded from low to high

‡ Coded from high to low

§ Includes primary, processing/machining, product fabricating, and construction occupations.

†† Reference category

* $p = 0.05$

$R^2 = .29$ for men and $.29$ for women; adjusted $R^2 = .28$ for men and $.28$ for women

d.f. men = 28, 4137; d.f. women = 28, 3973

Table E
Adjusted odds ratios relating selected characteristics to work injury, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Work stress				
High job strain [†]	1.2	0.8, 1.7	1.2 *	1.0, 1.4
High job insecurity [†]	1.1	0.8, 1.7	1.7	0.7, 4.0
High physical demands [†]	3.3 *	2.3, 4.8	1.9 *	1.7, 2.1
Low co-worker support [†]	1.2	0.8, 1.6	1.8 *	1.7, 1.8
Low supervisor support [†]	0.9	0.7, 1.3	1.1	1.0, 1.3
Occupation				
Administrative [‡]	1.0	...	1.0	...
Professional	1.7	0.7, 3.9	0.9	0.9, 1.0
Clerical	3.7 *	1.3, 10.3	0.5	0.2, 1.0
Sales	1.7	0.6, 4.9	0.9	0.7, 1.2
Service	1.9	0.9, 4.2	0.8 *	0.8, 0.9
Blue-collar [§]	3.2 *	1.6, 6.2	0.9	0.4, 1.8
Full-time employment[†]	3.1 *	1.2, 8.1	1.3 *	1.1, 1.7
Age				
18-24	2.2	1.0, 5.0	1.0	0.9, 1.1
25-34	1.6	0.8, 3.2	1.6	1.0, 4.2
35-44	1.3	0.6, 2.7	1.6	0.8, 3.2
45-54	1.0	0.5, 2.2	1.1	0.3, 4.5
55-64 [†]	1.0	...	1.0	...
Marital status				
Married [†]	1.0	...	1.0	...
Never married	0.7	0.5, 1.0	0.7 *	0.6, 0.8
Previously married	0.7	0.4, 1.3	0.8	0.4, 1.4
Child(ren) under age 12 in household[†]	1.0	0.7, 1.4	0.9	0.8, 1.2
Educational attainment				
Less than secondary graduation	0.7	0.4, 1.1	1.3	0.4, 4.0
Secondary graduation	0.7	0.4, 1.1	0.9	0.6, 1.2
Some postsecondary	0.9	0.6, 1.2	1.2	0.9, 1.5
College, trade or university graduation [†]	1.0	...	1.0	...
Lowest, lower-middle, middle household income group[†]	0.8	0.5, 1.0	1.3 *	1.2, 1.4
Smokes daily[†]	1.9 *	1.3, 2.6	0.8	0.6, 1.1
Recreational physical activities				
Low	1.3	0.9, 2.0	1.4	1.3, 1.5
Moderate	1.7	1.0, 2.7	1.3 *	0.5, 3.1
High [†]	1.0	...	1.0	...
One or more recent negative life events[†]	1.2	0.9, 1.7	1.5	0.9, 2.4
High chronic strain[†]	1.2	0.8, 1.6	1.0	0.6, 1.6
Lack of closeness[†]	0.9	0.6, 1.3	1.1	0.6, 1.9
Low sense of mastery[†]	1.0	0.8, 1.4	1.3 *	1.2, 1.4

Data source: 1994/95 National Population Health Survey, Health file

Notes: Analysis is based on 4,176 men and 4,007 women. Approximately 13% of male respondents and 8% of female respondents with a missing value on one or more of the variables were excluded from the analysis. "Unknown" categories for occupation and income were included in the model to maximize the sample size; however, their respective odds ratios are not shown. Confidence intervals are based on standard errors that were derived from the bootstrap technique for estimating the variance. Because of rounding, some confidence intervals with 1.0 as the lower limit were significant.

[†] Reference category is the absence of the characteristic; for example, the reference for high job strain is low job strain.

[‡] Reference category for which odds ratio is always 1.00

[§] Includes primary, processing/machining, product fabricating, and construction occupations.

* $p = 0.05$

... Figures not appropriate

Table F

Adjusted odds ratios relating selected characteristics to high blood pressure, by sex, employed population aged 18 to 64, Canada excluding territories, 1994/95

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Work stress				
High job strain [†]	0.9	0.6, 1.5	1.4	0.8, 2.3
High job insecurity [†]	1.0	0.7, 1.5	0.8	0.5, 1.3
High physical demands [†]	1.0	0.6, 1.6	1.0	0.6, 1.6
Low co-worker support [†]	1.1	0.7, 1.7	0.9	0.6, 1.4
Low supervisor support [†]	0.8	0.5, 1.1	0.9	0.6, 1.4
Occupation				
Administrative [‡]	1.0	...	1.0	...
Professional	0.7	0.4, 1.5	0.6	0.3, 1.1
Clerical	1.2	0.5, 3.1	1.2	0.6, 2.4
Sales	0.7	0.3, 1.7	0.9	0.4, 2.2
Service	1.0	0.5, 2.1	1.2	0.5, 2.7
Blue-collar [§]	0.8	0.4, 1.5	1.5	0.5, 4.4
Full-time employment[†]	0.6	0.3, 1.6	1.0	0.7, 1.5
Age				
18-24	0.04 *	0.00, 0.5	0.02 *	0.00, 0.1
25-34	0.06 *	0.03, 0.1	0.05 *	0.02, 0.1
35-44	0.3 *	0.2, 0.5	0.2 *	0.1, 0.4
45-54	0.6 *	0.3, 1.0	0.4 *	0.2, 0.6
55-64 [‡]	1.0	...	1.0	...
Marital status				
Married [‡]	1.0	...	1.0	...
Never married	0.6	0.3, 1.2	1.6	0.8, 3.3
Previously married	0.7	0.4, 1.4	1.3	0.8, 2.3
Child(ren) under age 12 in household[†]	0.9	0.5, 1.5	1.1	0.7, 2.0
Educational attainment				
Less than secondary graduation	1.1	0.6, 2.0	1.1	0.5, 2.1
Secondary graduation	1.3	0.7, 2.5	0.9	0.5, 1.7
Some postsecondary	1.3	0.8, 2.2	1.1	0.7, 1.9
College, trade or university graduation [†]	1.0	...	1.0	...
Lowest, lower-middle, middle household income group[†]	0.7	0.5, 1.2	1.0	0.6, 1.7
Smokes daily[†]	0.8	0.5, 1.3	0.9	0.6, 1.3
Recreational physical activities				
Low	1.2	0.7, 2.0	1.3	0.7, 2.2
Moderate	1.6	0.9, 2.8	1.0	0.5, 1.8
High [‡]	1.0	...	1.0	...
One or more recent negative life events[†]	1.4 *	1.0, 2.1	1.4	0.9, 2.1
High chronic strain[†]	1.3	0.8, 2.0	1.3	0.8, 2.1
Lack of closeness[†]	1.5	0.9, 2.7	1.0	0.6, 1.6
Low sense of mastery[†]	1.5	1.0, 2.2	0.9	0.6, 1.4

Data source: 1994/95 National Population Health Survey, Health file

Notes: Analysis is based on 4,172 men and 4,004 women. Approximately 13% of male respondents and 8% of female respondents with a missing value on one or more variables were excluded from the analysis. "Unknown" categories for occupation and income were included in the model to maximize the sample size; however, their respective odds ratios are not shown. Confidence intervals are based on standard errors that were derived from the bootstrap technique for estimating the variance. Because of rounding, some confidence intervals with 1.0 as the lower limit were significant.

[†] Reference category is absence of the characteristic; for example, the reference for high job strain is low job strain.

[‡] Reference category for which odds ratio is always 1.00

[§] Includes primary, processing/machining, product fabricating, and construction occupations.

* $p = 0.05$

... Figures not appropriate