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# Stress and depression in the employed population

by Margot Shields

Analytical Studies and Reports  
Room 2602, Main Building, Ottawa, K1A 0T6

Telephone: 1 613 951-4177



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# Stress and depression in the employed population

*Margot Shields*

## **Abstract**

### **Objectives**

This article describes stress levels among the employed population aged 18 to 75 and examines associations between stress and depression.

### **Data sources**

Data are from the 2002 Canadian Community Health Survey: Mental Health and Well-being and the longitudinal component of the 1994/95 through 2002/03 National Population Health Survey.

### **Analytical techniques**

Stress levels were calculated by sex, age and employment characteristics. Multivariate analyses were used to examine associations between stress and depression in 2002, and between stress and incident depression over a two-year period, while controlling for age, employment characteristics, and factors originating outside the workplace.

### **Main results**

In 2002, women reported higher levels of job strain and general day-to-day stress. When the various sources of stress were considered simultaneously, along with other possible confounders, for both sexes, high levels of general day-to-day stress and low levels of co-worker support were associated with higher odds of depression, as was high job strain for men. Over a two-year period, men with high strain jobs and women with high personal stress and low co-worker support had elevated odds of incident depression.

## **Keywords**

health surveys, job strain, life stress, longitudinal studies, occupational health, work stress

## **Author**

Margot Shields (613-951-4177; Margot.Shields@statcan.ca) is with the Health Statistics Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

Depression is a debilitating condition that places an enormous burden on society. In 2000, the World Health Organization ranked depression as the leading cause of disability worldwide.<sup>1</sup> An important component of the economic impact of depression is lost productivity in the workplace.<sup>2</sup> Workers suffering from depression are more likely to take time off because of short- and long-term disability, and depressed people tend to be less productive on the job.<sup>3-7</sup>

Previous studies have found that stress both on and off the job is associated with a wide variety of mental health problems.<sup>8-29</sup> Although these relationships are not fully understood, it is thought that stress is instrumental in eroding positive self-concept, making those who experience stress more vulnerable to mental health problems such as depression.<sup>30</sup>

Understanding workers' vulnerability to different sources of stress is important, as is how these different stressors can interact to affect workers' mental health. Such information could help employers take steps to reduce or prevent stress, and thus perhaps lower the risk of depression.

The jobs considered to be the most stressful are often referred to as “high strain” jobs.<sup>14</sup> This means that demands are high, yet workers have few opportunities to use their skills and make decisions. The effects of high job strain on cardiovascular disease have been well documented,<sup>31</sup> but associations with mental health have not been studied as extensively, especially longitudinally.<sup>10,18</sup> Job strain is only one of the stressors workers may face in day-to-day life. Lack of support from supervisors and co-workers, for example, can cause stress. And, of course, workers may confront stress at home and in other areas of their lives.

This article, based on data from the 2002 Canadian Community Health Survey (CCHS) cycle 1.2: Mental Health and Well-being, describes stress levels of employed Canadians, considering variations by sex, age and employment characteristics. Job strain, low co-worker support, low supervisor support, and general or personal

day-to-day stress are all considered (see *Defining stress and depression*). Cross-sectional relationships between stress and depression are examined. The association between stress and the incidence of depression over a two-year period is investigated using longitudinal data from the first five cycles of the National Population Health Survey (NPHS). These relationships are analyzed using multivariate techniques that control for employment characteristics, as well as factors originating outside the workplace (see *Data sources, Analytical techniques and Limitations*).

### **Job strain more common among women**

Job strain comprises high psychological demands and low decision latitude.<sup>14</sup> The 2002 CCHS asked a series of questions to measure these two components, and scores ranging from 0 to 10 were calculated for each (see *Defining stress and depression*). On average, women had significantly higher scores

## **Data sources**

*Canadian Community Health Survey:* The cross-sectional analysis on stress levels and their associations with depression is based on data from the 2002 Canadian Community Health Survey (CCHS) cycle 1.2: Mental Health and Well-being, which began in May 2002 and was conducted over eight months. The survey covered people aged 15 or older living in private dwellings in the 10 provinces. Residents of the three territories, Indian reserves, institutions, certain remote areas, members of the regular Armed Forces and civilian residents of military bases were excluded.

The sample was selected using the area frame designed for the Canadian Labour Force Survey. A multi-stage stratified cluster design was used to sample dwellings within this area frame. One person aged 15 or older was randomly selected from the sampled households. Individual respondents were selected to over-represent young people (15 to 24) and seniors (65 or older), thus ensuring adequate sample sizes for these age groups. More detailed descriptions of the design, sample and interview procedures can be found in other reports and on the Statistics Canada Web site.<sup>32,33</sup> All interviews were conducted using a computer-assisted application. Most (86%) were conducted in person; the remainder, by telephone. Selected respondents were required to provide their own information, and proxy responses were not accepted. The responding sample

consisted of 36,984 people aged 15 or older; the response rate was 77%.

*National Population Health Survey:* The analysis of associations between stress and incident depression over a two-year period is based on data from National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of Canadians every two years. It covers household and institutional residents in all provinces and territories, except persons living on Indian reserves, on Canadian Forces bases, and in some remote areas.

In 1994/95, 20,095 respondents were selected for the longitudinal panel. The response rate for this panel in 1994/95 was 86.0%, representing 17,276 respondents; attempts were made to re-interview these 17,276 respondents every two years. The response rates for subsequent cycles, based on these 17,276 individuals, were: 92.8% for cycle 2 (1996/97); 88.2% for cycle 3 (1998/99); 84.8% for cycle 4 (2000/01); and 80.6% for cycle 5 (2002/03). More detailed descriptions of the NPHS design, sample and interview procedures can be found in published reports.<sup>34,35</sup>

This analysis uses the cycle 5 (2002/03) longitudinal “square” file, which contains records for all responding members of the original panel whether or not information about them was obtained in all subsequent cycles.

## Analytical techniques

The prevalence of stress among workers was estimated using data from the 2002 Canadian Community Health Survey (CCHS) cycle 1.2: Mental Health and Well-being. Four sources of stress were considered: job strain, high general day-to-day stress, low co-worker support and low supervisor support. The data were weighted to represent the population of the provinces in 2002.

Cross-tabulations were used to study cross-sectional associations between the four sources of stress and having experienced a major depressive episode (MDE) in the previous 12 months. These relationships were also examined in a series of sex-specific multivariate logistic regression models. In the first set of models, the unadjusted odds of having had an MDE were estimated for each of the four sources of stress individually. In the second set, these same associations were examined controlling for possible confounders: occupation, working hours, shift work, self-employment, age, marital status, the presence of children in the household, education, personal income, heavy monthly drinking and low emotional support. In the final models, the four stressors were considered simultaneously in addition to the other control variables to determine if they were independently associated with depression. Correlations between the four stress measures were low to moderate.

### Correlations between stress/support scores by sex, employed population aged 18 to 75, Canada excluding territories, 2002

	Job strain	General day-to-day stress	Co-worker support	Supervisor support
<b>Men</b>				
Job strain	1.00	0.18	-0.20	-0.11
General day-to-day stress	...	1.00	-0.17	-0.08
Co-worker support	...	...	1.00	0.27
Supervisor support	...	...	...	1.00
<b>Women</b>				
Job strain	1.00	0.16	-0.21	-0.14
General day-to-day stress	...	1.00	-0.14	-0.06
Co-worker support	...	...	1.00	0.33
Supervisor support	...	...	...	1.00

... not applicable

**Notes:** A higher score indicates a higher level of job strain, general day-to-day stress, co-worker support or supervisor support.

**Source:** 2002 Canadian Community Health Survey: Mental Health and Well-being

All analyses were conducted separately for men and women and were based on those aged 18 to 75 who were employed at the time of the CCHS interview. The sample size was 10,660 for men and 10,087 for women; 396 of these men and 658 of these women were classified as having had an MDE in the previous year.

Associations between stress and the two-year incidence of depression were based on data from the National Population Health

Survey (NPHS). Pooling of repeated observations was combined with logistic regression analysis. Two cohorts of pooled observations were used, with baseline years of 1994/95 (cycle 1) and 2000/01 (cycle 4). These are the two NPHS cycles for which questions on stress were asked and information on depression was available two years later.

For each baseline year, adults aged 18 to 75 who were employed at the time of the NPHS interview were selected. Those who had experienced an MDE in the year before the baseline interview were excluded. The incidence of depression among the remaining respondents two years later was estimated in relation to the four stress variables at baseline. Records were excluded if depression status at follow-up was unknown. Sample sizes were:

Cohort	Baseline	Follow-up	Workers (baseline)		Depression (at follow-up)	
			Men	Women	Men	Women
Cycle 1	1994/95	1996/97	3,199	2,994	72	134
Cycle 4	2000/01	2002/03	2,926	2,892	71	128
<b>Total</b>			<b>6,125</b>	<b>5,886</b>	<b>143</b>	<b>262</b>

Because the analysis is based on new "cases" of depression over a two-year period, it is possible that some workers may have contributed to more than one case in the calculation of the incidence rates. For example, a worker who was free from depression in 1994/95, subsequently reported depression in 1996/97, then was free from depression in 2000/01 and reported it again in 2002/03 contributed two "cases" of incident depression. The bootstrap method accounts for the increase in variance that may result from having repeated observations, because the same individual is always in the same bootstrap sample.<sup>36</sup>

A series of multiple logistic regression models was used on the pooled set of observations to estimate associations between stress in the baseline year and subsequent depression. The first three sets of models were similar to the ones used for the cross-sectional analysis, with all of the independent variables measured as of the baseline year. A fourth set of models was introduced that controlled for mastery in addition to the other variables in the earlier models.

For the longitudinal analysis, personal stress was considered (see *Defining stress and depression*).

For ease of interpretation, in all the regression models, categorical values were used to classify respondents' stress levels. This may have reduced the sensitivity of these measures.<sup>37,38</sup> However, when the regressions were rerun using continuous stress measures, all results were similar (data not shown).

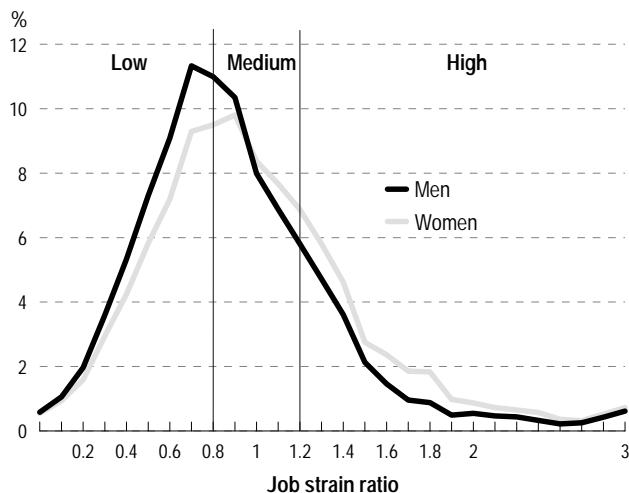
To account for the survey design effects of the CCHS and the NPHS, coefficients of variation and p-values were estimated and significance tests were performed using the bootstrap technique.<sup>39-41</sup> The significance level was set at  $p < 0.05$ .

for psychological demands and lower scores for decision latitude than did men (Table 1). Women's scores were lower for the two aspects of decision latitude: skill discretion and decision authority.

High strain jobs are psychologically demanding, yet provide little opportunity for workers to make decisions or apply their skills. In 2002, female workers were consistently more likely than male workers to have job strain scores over 1 (Chart 1), indicating that the demands of the job outweighed their freedom to make decisions or to apply their skills. Men, on the other hand, were more likely to have scores below 1, meaning that their decision latitude exceeded demands.

Job strain was classified as low, medium or high. Women were more likely (27%) than men (19%) to have high job strain, while men were more likely to have low job strain (47% versus 38% for women) (Table 1). When examined in a multivariate model controlling for other employment-related characteristics including occupation, work schedule, working hours and personal income, the finding that women were more likely to experience high strain on the job persisted (data not shown). Other research has also generally found that women are more likely to be in high strain jobs, and that men perceive higher job control than do women.<sup>18,21,23,42,43</sup>

Chart 1  
Percentage distribution of employed population aged 18 to 75, by job strain ratio<sup>1</sup> and sex, Canada excluding territories, 2002



<sup>1</sup> Psychological demands divided by decision latitude  
Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

Table 1  
Stress and support scores for employed population aged 18 to 75, Canada excluding territories, 2002

	Men	Women
<b>Job strain, average score</b>	<b>0.90</b>	<b>1.00*</b>
High (ratio 1.2 or more) %	18.8	26.6*
Medium (ratio between 0.8 and 1.2) %	34.0	35.4
Low (ratio 0.8 or less) %	47.1	38.0*
<b>Components of job strain</b>		
<b>Psychological demands, average score</b>	5.61	5.85*
Job is very hectic - % agreeing	58.0	62.5*
Free from conflicting demands - % disagreeing	40.9	43.6*
<b>Decision latitude, average score</b>	6.66	6.27*
<b>Skill discretion, average score</b>	6.31	6.02*
Learning new things required - % agreeing	82.2	81.5
High skill level required - % agreeing	79.9	72.2*
Must do things over and over - % disagreeing	24.6	20.0*
<b>Decision authority, average score</b>	7.19	6.66*
Have freedom to make decisions - % agreeing	78.9	70.5*
Have a lot to say about what happens in job - % agreeing	70.2	61.1*
<b>General day-to-day stress, average score</b>	<b>4.69</b>	<b>5.04*</b>
<b>High general day-to-day stress</b>		
Most days quite a bit/extremely stressful - % agreeing	25.3	29.3*
<b>Co-worker support, average score</b>	<b>6.75</b>	<b>6.72</b>
<b>Low co-worker support (%)<sup>1</sup></b>	<b>32.2</b>	<b>32.4</b>
Exposed to hostility or conflict - % agreeing	28.6	27.9
People are helpful - % disagreeing	6.1	6.9
<b>Supervisor support, average score</b>	<b>6.40</b>	<b>6.54*</b>
<b>Low supervisor support</b>		
Supervisor is helpful - % disagreeing	17.2	16.4

<sup>1</sup> Percentage agreeing with the first item or disagreeing with the second item  
\* Significantly different from estimate for men (p < 0.05)

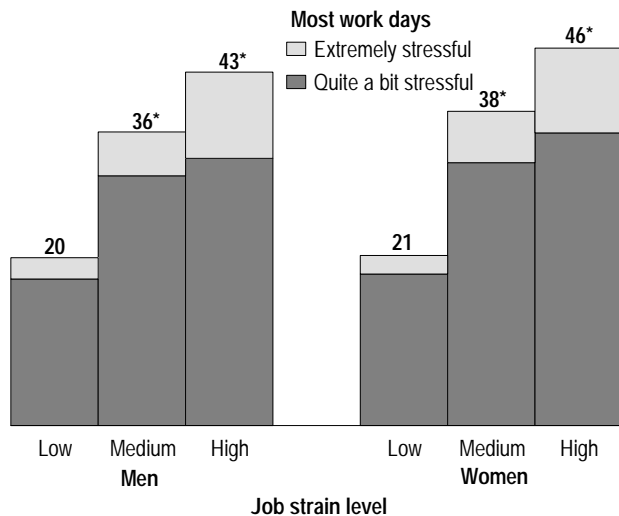
Notes: Higher scores indicate higher levels of job strain, psychological demands, skill discretion, decision authority and general day-to-day stress. For co-worker and supervisor support, higher scores indicate more support. With the exception of job strain, all scores have been prorated so the minimum value is 0 and the maximum value is 10.

Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

### On-the-job stress, dissatisfaction

Not surprisingly, workers in high strain jobs were more likely to report on-the-job stress. Men and women in high strain jobs were more than twice as likely to find most workdays “extremely” or “quite a bit” stressful, compared with those experiencing a low level of job strain (Chart 2). And, consistent with other studies, high strain jobs were associated with job dissatisfaction.<sup>13,14</sup> Women in jobs with a high level of strain were four times as likely to be dissatisfied than were those with a low level, and men, five times as likely (Chart 3).

Chart 2  
 Percentage perceiving high work stress, by level of job strain and sex, employed population aged 18 to 75, Canada excluding territories, 2002



\* Significantly higher than estimate for previous category ( $p < 0.05$ )  
 Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

Chart 3  
 Percentage reporting job dissatisfaction, by level of job strain and sex, employed population aged 18 to 75, Canada excluding territories, 2002



\* Significantly higher than estimate for previous category ( $p < 0.05$ )  
 Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

### Support at work, general stress

Approximately one of every three employees reported low support from co-workers (32%) and one in six, low support from supervisors—two other sources of work stress (Table 1).

CCHS respondents were also asked about the amount of stress they perceived in general, in their day-to-day lives. Women were more likely (29%) than men (25%) to report that most days were “quite a bit” or “extremely” stressful.

### Age, occupation

Stress levels varied between older and younger workers, and by selected employment characteristics. Compared with 40- to 54-year-olds, men and women aged 18 to 24 were more likely to report high job strain (Table 2). At the same time, however, the younger group perceived lower levels of general day-to-day stress. Workers aged 55 or older of both sexes also reported lower levels of general stress, and older male workers had lower levels of job strain.

Previous studies have found that white-collar workers, particularly men, perceive the highest levels of control at work, while blue-collar workers, especially women, perceive the lowest.<sup>42-44</sup> Consistent with these findings, men and women who worked as managers, professionals or technologists were the least likely to have high job strain. Those employed in processing, manufacturing or utilities and sales and service were the most likely to have this level of strain. In fact, close to half of the women in processing, manufacturing or utilities occupations reported high job strain. By contrast, male and female managers were the most likely to report high levels of general stress.

### Work schedule

Men who worked part time (less than 30 hours per week) were more likely than those with regular hours (between 30 and 40) to have high job strain. Yet part-time workers of both sexes perceived the least general day-to-day stress, while workers with long hours reported the most (Table 2).

## Defining stress and depression

To measure *job strain*, respondents were asked to “strongly agree,” “agree,” “neither agree nor disagree,” “disagree” or “strongly disagree” with the following statements:

- (a) Your job requires that you learn new things.
- (b) Your job requires a high level of skill.
- (c) Your job allows you freedom to decide how you do your job.
- (d) Your job requires that you do things over and over. (Reverse scored.)
- (e) Your job is very hectic.
- (f) You are free from conflicting demands that others make. (Reverse scored.)
- (g) You have a lot to say about what happens in your job.

A score was derived for each of the three components of job strain: *psychological demands*, based on items (e) and (f); *decision authority*, (c) and (g); and *skill discretion*, (a), (b) and (d). Scores were calculated by assigning a value between 4 (strongly agree) and 0 (strongly disagree) to each item of the component and then summing across the items. The scoring algorithm was created so that higher scores indicate higher demands, higher decision authority or higher skill discretion; scoring for items (d) and (f) was reversed. A *decision latitude* score was calculated by adding the scores for decision authority and skill discretion. All scores were adjusted (prorated) so that all respondents had a potential maximum of 10, consistent for all measures. The job strain ratio was then calculated by dividing the adjusted score for psychological demands by that of decision latitude. Since both the numerator and denominator were prorated to be out of 10, this ensured that the potential contributions for psychological demands and decision latitude were equal. A small constant (0.1) was added to the numerator and denominator to avoid division by 0. To deal with outliers, scores greater than 3 were set to 3; this affected approximately 1% of the records.

In many studies of associations between job strain and health, job strain has been defined as workers scoring above the median on demands and below the median on latitude. Using a quotient to measure job strain is a relatively new approach, but it allows more flexibility in choosing cut-points to classify high strain jobs.<sup>31</sup> Respondents were classified as being in high strain jobs if the ratio was 1.2 or higher. Values between 0.8 and 1.2 indicate medium strain; 0.8 or lower, low strain.

The following statements were used to measure *co-worker* and *supervisor support*:

- You are exposed to hostility or conflict from the people you work with. (Reverse scored.)
- The people you work with are helpful in getting the job done.
- Your supervisor is helpful in getting the job done.

Response categories ranged from “strongly agree” to “strongly disagree,” and scores were calculated in a similar way to job strain,

with higher values indicating greater support. Similarly adjusted (prorated) scores were calculated so that all respondents had a potential maximum of 10. Respondents were classified as having low co-worker support if they agreed or strongly agreed with the first item dealing with co-worker support or disagreed or strongly disagreed with the second item, and as having low supervisor support if they disagreed or strongly disagreed with the supervisor support item.

For the 2002 Canadian Community Health Survey (CCHS), *general day-to-day stress* was determined with the question, “Thinking about the amount of stress in your life, would you say that most days are: not at all stressful? not very stressful? a bit stressful? quit a bit stressful? extremely stressful?” Respondents were classified as having high day-to-day stress if they replied “extremely stressful” or “quite a bit stressful.” A continuous score was also assigned, ranging from 4 (extremely stressful) down to 0 (not at all stressful) and then adjusted (prorated) so the maximum value was 10.

The question on general stress was not asked in cycles 1 and 4 of the National Population Health Survey (NPHS); five “true/false” statements were used to measure *personal stress*:

- 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.
- Your work around the home is not appreciated.
- People are too critical of you or what you do.

A personal stress score was obtained by summing the “true” responses. Respondents were classified as having high personal stress if they responded “true” to two or more items.

The CCHS used the World Mental Health version of the Composite International Diagnostic Interview (WMH-CIDI) to estimate the prevalence of various mental disorders including *depression*. The WMH-CIDI was designed to be administered by lay interviewers and is generally based on diagnostic criteria outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV®-TR)*.<sup>45</sup> Based on expert advice, the WMH-CIDI and the algorithms used to identify depression and other mental disorders were revised over a period of time. The questionnaire used for the CCHS is available at [www.statcan.ca/english/concepts/health/cycle1.2/index.htm](http://www.statcan.ca/english/concepts/health/cycle1.2/index.htm) and the algorithm used to measure the 12-month prevalence of depression is available in the Annex of the 2004 *Health Reports* supplement.<sup>46</sup> The NPHS used a subset of questions from the *Composite International Diagnostic Interview*, according to the method of Kessler et al.<sup>47</sup> The questions cover a cluster of symptoms listed in the *Diagnostic and Statistical Manual of Mental Disorders*, third revised edition.<sup>48</sup> For this article, the presence of depression refers to the 12 months preceding the date of the survey interview.

Shift work has been shown to be detrimental to workers' health.<sup>49-51</sup> According to the CCHS data, shift workers were more likely to report high job strain than were people with more regular hours. At the same time, however, they had lower levels of general stress.

### Other employment characteristics

Self-employed men were less likely than other male workers to perceive high job strain, but were more likely to report high general stress (Table 2). Likewise, for women, being self-employed was associated with lower levels of job strain. Self-

employment, however, was unrelated to general stress levels among women.

Personal income was inversely associated with job strain and positively related to general stress for both sexes. Workers with low incomes tended to perceive higher job strain, but lower general stress.

CCHS respondents' answers to questions on the amount of day-to-day stress they perceived do not indicate which aspects of their lives they were considering. However, given that associations between job strain and general stress and other correlates were often in opposite directions, job

Table 2  
Percentage reporting high work and personal stress, by sex, age and selected employment characteristics, employed population aged 18 to 75, Canada excluding territories, 2002

	High job strain		High general day-to-day stress		Low co-worker support		Low supervisor support	
	Men	Women	Men	Women	Men	Women	Men	Women
	%		%		%		%	
<b>Total</b>	19	27	25	29	32	32	17	16
<b>Age group</b>								
18 to 24	27*	31*	17*	23*	31	30	15	13
25 to 39	19	27	26	29	33	36*	17	19
40 to 54 <sup>†</sup>	19	26	29	33	34	31	18	16
55 or older	12*	22	22*	25*	26*	28	18	16
<b>Occupation<sup>†</sup></b>								
Management	13*	18*	37*	43*	44*	39*	15	16
Professional/Technologist	13*	19*	28	31	30	34	17	16
Administrative/Financial/Clerical	18	27	32	30	27	29	17 <sup>E</sup>	17
Sales/Service	27*	32*	23	25*	31	31	16	17
Trades/Transport/Equipment operating	20	34	20*	26	33	32	18	17
Farming/Forestry/Fishing/Mining	14	22 <sup>E</sup>	22	13 <sup>E</sup>	24*	29 <sup>E</sup>	14	12 <sup>E</sup>
Processing/Manufacturing/Utilities	30*	48*	21	29	30	38	22	17
<b>Weekly work hours</b>								
Part-time (1 to 29)	24*	26	14*	23*	29	28	17	17
Regular (30 to 40) <sup>†</sup>	19	27	20	28	30	32	17	16
Long (more than 40)	18	26	33*	41*	35*	39*	17	17
<b>Shift worker</b>								
Yes	25*	32*	22*	26*	34	34	17	17
No <sup>†</sup>	16	24	26	30	32	32	17	16
<b>Self-employed</b>								
Yes	9*	12*	30*	29	29*	30	...	...
No <sup>†</sup>	21	29	24	29	33	33	...	...
<b>Personal income</b>								
Less than \$20,000	28*	30*	23*	25*	29	29*	17	15
\$20,000 to \$39,999	22*	28*	22*	28*	30	33	18	18
\$40,000 to \$59,999	17*	23*	25*	36	36	37	17	18
\$60,000 or more <sup>†</sup>	12	15	31	41	33	37	16	15

<sup>†</sup> Reference category

<sup>‡</sup> Reference category is the total.

\* Significantly different from estimate for reference category ( $p < 0.05$ , adjusted for multiple comparisons)

<sup>E</sup> Use with caution (coefficient of variation 16.6% to 33.3%)

... not applicable

Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

## Employment and other characteristics

A *worker* was defined as a respondent aged 18 to 75 who was employed at the time of the Canadian Community Health Survey (CCHS) or National Population Health Survey (NPHS) interview. If a respondent had more than one job, the variables used for occupation, hours of work, shift work and self-employment were based on the main job; that is, the one with the highest number of weekly work hours.

For the CCHS, respondents were asked which of nine categories best described their *occupation*: (1) management; (2) professional; (3) technologist, technician, or technical occupation; (4) administrative, financial or clerical; (5) sales or service; (6) trades, transport or equipment operator; (7) occupation in farming, forestry, fishing or mining; (8) occupation in processing, manufacturing or utilities; (9) or any other occupation. For the NPHS, occupation was grouped into similar categories based on the 1991 Standard Occupational Classification.<sup>52</sup>

Three categories of *weekly work hours* were developed, based on the number of hours worked at the main job: part-time (1 to 29); regular (30 to 40); or long (more than 40).

Shift work was derived based on the question "Which of the following best describes the hours you usually work on the job?" Respondents who answered anything but a regular daytime schedule were classified as *shift workers*.

Respondents who "worked mainly in their own business, farm or professional practice" were defined as *self-employed*.

For the CCHS, four groups were established based on total *personal income* from all sources in the previous 12 months: less than \$20,000; \$20,000 to \$39,999; \$40,000 to \$59,999; and \$60,000 or more. Personal income was not asked in the first cycle of the NPHS; therefore, household income was used as a control variable in the NPHS regression models. *Household income* groups were based on the number of people in the household and total household income from all sources in the 12 months before the interview:

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

Four *age groups* were used for this analysis: 18 to 24, 25 to 39, 40 to 54, and 55 or older.

Respondents were asked their current *marital status*. Those who indicated "now married," "common-law" or "living with partner" were grouped as "married."

*Presence of children in the household* means that at least one child under the age of 12 lived in the household.

Two *education* categories represent the highest level attained: postsecondary graduation, or less than postsecondary graduation.

*Heavy monthly drinking* was measured by asking respondents the number of times in the past year they had had 5 or more alcoholic drinks on one occasion; at least once a month was classified as *heavy monthly drinking*. NPHS cycle 1 respondents were asked the number of times in the past year they had had 5 or more drinks on one occasion; 12 or more times was considered heavy monthly drinking.

To measure *perceived emotional support*, CCHS and NPHS cycle 4 respondents were asked: "How often is each of the following kinds of social support available to you if you need it? Someone:

- you can count on to listen when you need to talk?"
- to give you advice about a crisis?"
- to give you information in order to help you understand a situation?"
- to confide in or talk to about yourself or your problems?"
- whose advice you really want?"
- to share your most private worries and fears with?"
- to turn to for suggestions about how to deal with a personal problem?"
- who understands your problems?"

They were also asked to indicate how often the support was available. Respondents who answered "none of the time" or "a little of the time" for at least one item were classified as having *low emotional support*. In cycle 1 of the NPHS, four "yes/no" questions were used to measure this variable, and respondents who answered "no" at least once were considered to have *low emotional support*:

- "Do you have someone you can talk to about your private feelings or concerns?"
- "Do you have someone you can really count on in a crisis situation?"
- "Do you have someone you can really count on to give you advice when you are making important personal decisions?"
- "Do you have someone who makes you feel loved and cared for?"

For the NPHS analysis, *daily smokers* were defined as those who smoked cigarettes every day. Smoking status was not used in the analysis based on 2002 CCHS data because questions on smoking were not included.

In the NPHS, to measure *mastery*, respondents were asked to react to seven statements, ranked on a five-point scale ranging from "strongly agree" (score 0) to "strongly disagree" (score 4):

- You have little control over the things that happen to you.
- There is really no way you can solve 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 you are being pushed around in life.
- What happens in the future mostly depends on you. (Reverse scored.)
- You can do just about anything if you set your mind to it. (Reverse scored.)

Responses were summed (ranging from 0 to 28), with higher scores indicating greater mastery (Cronbach's alpha = 0.76). Respondents in the lower quartile of the distribution were classified as having low mastery. Questions on mastery were not asked in the CCHS.

strain and day-to-day stress are obviously measuring different aspects of workers' lives.

Associations between employment characteristics were less evident for the other sources of work stress considered in this analysis: low support from co-workers and supervisors. Men and women in management, as well as those who worked long hours, were more likely to perceive low co-worker support, while men who were self-employed and women with low personal incomes were less likely to do so. None of the variables considered was significantly related to low support from supervisors.

### Stress and depression

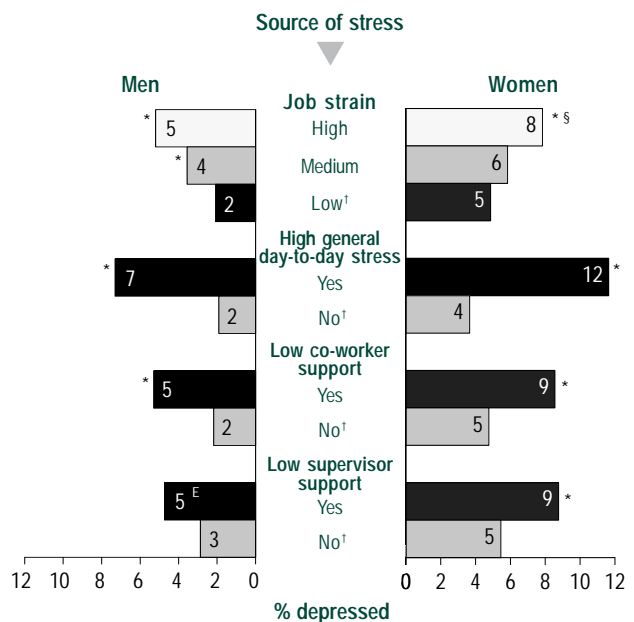
According to the 2002 CCHS, 3% of male workers and 6% of female workers had experienced a major depressive episode in the year before their survey interview. For workers of both sexes, high stress, on and off the job, was associated with depression, a result consistent with other studies.<sup>8-29</sup> Men in high strain jobs were 2.5 times more likely and women 1.6 times more likely than their counterparts in low strain jobs to have experienced depression (Chart 4). Male and female workers who considered most days to be quite a bit or extremely stressful were over 3 times more likely to have suffered a major depressive episode, compared with those who reported low levels of general stress. Low co-worker support was associated with a higher prevalence of depression for both sexes. Low supervisor support was significantly associated with a higher rate of depression for women, but only approached significance for men ( $p=0.054$ ).

Associations between stress and depression were examined in multivariate models controlling for age and the employment characteristics shown to be related to stress. Mental health problems are also associated with personal characteristics such as marital status, presence of children in the household, education, heavy drinking and perceived emotional support.<sup>53</sup> Previous studies have been criticized for failing to control for possible confounders such as age, socio-economic status and social support.<sup>31</sup> But even when all of

these factors were taken into account, each of the four sources of stress was associated with elevated odds of depression for both sexes (Table 3). In fact, the adjusted odds ratios relating stress to depression, which controlled for all of these potentially confounding variables, were very similar to the unadjusted odds.

The four sources of stress considered in this analysis do not necessarily occur in isolation (see *Analytical techniques*), and workers may also be particularly vulnerable to a specific type of stress. When the four sources of stress were taken into account simultaneously in addition to the other variables, the association between job strain and depression persisted for men, but not for women. As well, the association with low supervisor support disappeared for both sexes. By contrast, general day-to-day stress and low co-worker support remained independently associated with depression for male and female workers.

Chart 4  
Prevalence of depression, by sex and source of stress, employed population aged 18 to 75, Canada excluding territories, 2002



† Reference category  
 \* Significantly higher than estimate for reference category ( $p < 0.05$ )  
 § Significantly higher than estimate for medium ( $p < 0.05$ )  
 E Use with caution (coefficient of variation 16.6% to 33.3%)  
 Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

## Limitations

For this analysis, high strain jobs are those for which workers have reported high psychological demands coupled with low decision latitude. These measures were based on the individual worker's perceptions and are thus subject to response bias (i.e., it is possible that two workers with similar work situations could have different perceptions and therefore different job strain scores). Validation studies with more objective assessments have found high correlations with self-reported ratings for decision latitude, but concluded that psychological demands are more subjective.<sup>14,31</sup> Furthermore, assessments of depression were based on self-reports and therefore may have resulted in bias when measuring associations between stress and depression. Negative affectivity, or a general tendency to be pessimistic, may have resulted in an overestimation of the odds ratios between depression and stress. In the longitudinal analysis, controlling for mastery may have partly addressed this limitation, depending on the extent to which negative affectivity is correlated with mastery.

It was not possible to control for some employment-related variables such as union membership, job permanency and employment income because they were not available in the Canadian Community Health Survey (CCHS) cycle 1.2 or the National Population Health Survey (NPHS). Including these variables might have altered associations between stress and depression.

In the longitudinal analyses, incident depression over a two-year period was examined in relation to stress at the beginning of the period. Only workers who were free from depression at the start were considered. However, these workers may have had a past history of depression, and the failure to control for this could have biased the findings. As well, the various sources of stress were measured only at the baseline year, and the length of time workers might have been exposed to stress is unknown. Depression was measured two years later at the follow-up interview. Some workers may have left the labour force or changed jobs at various points over this two-year period.

Using 2002 CCHS data, Cronbach's alpha was used to assess the internal consistency of the work stress indices. It was not possible to produce such an estimate for supervisor support because only one item was used to measure this construct. The internal consistency estimates were 0.32 for psychological demands of work, 0.62 for decision latitude, and 0.21 for support from co-workers. Previous studies based on all items from Karasek's Job Content Questionnaire,<sup>43</sup> which contains more items for each of these scales, have reported internal consistency estimates of 0.7 or above for all three scales.<sup>11,43,54</sup> The relatively low estimates of internal consistency found here are partly due to the limited number of items available from the CCHS (and the NPHS) to measure work stress. These low consistency scores may have affected associations between work stress and depression in both the cross-sectional and longitudinal analyses. This is particularly true for supervisor support, since only one item was used to measure this construct.

The potential for selection bias due to respondent attrition is problematic in longitudinal research. For the longitudinal analysis based on NPHS data, stress levels among workers aged 18 or older in cycles 1 and 4 (baseline cycles) were examined in relation to incident depression two years later in cycles 2 and 5 (follow-up cycles), respectively (see *Analytical techniques*). From one survey cycle to the next, respondents were lost from the analysis for reasons such as refusal to participate, death, item non-response, institutionalization or relocation out of the country. From the pooled total of 6,866 male workers assessed in the baseline cycles, 10.8% (741) did not respond in the follow-up cycle. For female workers, 8.6% were lost to follow-up (556 of the 6,442 workers assessed at baseline).

### Non-respondents (unweighted sample), by sex, employed population aged 18 or older, NPHS

Men			Women		
Respondents at baseline	Non-respondents at follow-up		Respondents at baseline	Non-respondents at follow-up	
(1994/95) 3,490	(1996/97) 291	8.3%	(1994/95) 3,232	(1996/97) 238	7.4%
(2000/01) 3,376	(2002/03) 450	13.3%	(2000/01) 3,210	(2002/03) 318	9.9%
<b>Total 6,866</b>	<b>741</b>	<b>10.8%</b>	<b>6,442</b>	<b>556</b>	<b>8.6%</b>

To assess the potential for non-response bias on the results, the weighted proportions of non-respondents were compared among stress levels. No significant differences emerged between stress categories for any of the four sources of stress.

### Non-response rates (weighted) at follow-up, by sex and stress levels at baseline, employed population aged 18 or older, NPHS, 1994/95 to 2002/03

	Men	Women
<b>Total</b>	<b>11.1</b>	<b>9.1</b>
<b>Job strain</b>		
High	10.7	10.3
Medium	11.0	8.1
Low	11.3	8.6
<b>High personal stress</b>		
Yes	11.3	9.5
No	10.9	8.9
<b>Low co-worker support</b>		
Yes	10.7	9.4
No	11.2	8.3
<b>Low-supervisor support</b>		
Yes	11.2	8.7
No	11.0	9.2

The survey weights were based on the response status in cycle 1 and were not inflated to account for subsequent non-response. This could have biased estimates if the characteristics of continuers in the longitudinal panel differed from non-respondents.

Table 3  
Unadjusted and adjusted odds ratios relating selected sources of stress to depression, by sex, employed population aged 18 to 75, Canada excluding territories, 2002

Source of stress	Unadjusted odds ratio	95% confidence interval	Controlling for employment and personal characteristics <sup>‡</sup>		Controlling for employment and personal characteristics <sup>‡</sup> and other three sources of stress <sup>‡</sup>	
			Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
<b>Job strain</b>						
<b>Men</b>						
High	2.6*	1.8, 3.7	2.4*	1.7, 3.5	1.7*	1.2, 2.5
Medium	1.7*	1.2, 2.5	1.8*	1.3, 2.6	1.6*	1.1, 2.3
Low <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Women</b>						
High	1.7*	1.2, 2.2	1.5*	1.1, 2.0	1.1	0.8, 1.5
Medium	1.2	0.9, 1.7	1.2	0.9, 1.7	1.1	0.7, 1.5
Low <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>High general day-to-day stress</b>						
<b>Men</b>						
Yes	4.0*	3.0, 5.5	4.4*	3.2, 6.0	3.8*	2.7, 5.2
No <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Women</b>						
Yes	3.5*	2.7, 4.4	3.6*	2.8, 4.7	3.5*	2.7, 4.6
No <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Low co-worker support</b>						
<b>Men</b>						
Yes	2.5*	1.9, 3.4	2.4*	1.7, 3.3	1.9*	1.4, 2.6
No <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Women</b>						
Yes	1.9*	1.5, 2.4	1.8*	1.4, 2.4	1.5*	1.1, 2.1
No <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Low supervisor support</b>						
<b>Men</b>						
Yes	1.7*	1.1, 2.6	1.7*	1.0, 2.7	1.3	0.8, 2.0
No <sup>†</sup>	1.0	...	1.0	...	1.0	...
<b>Women</b>						
Yes	1.7*	1.2, 2.3	1.6*	1.2, 2.2	1.3	0.9, 1.9
No <sup>†</sup>	1.0	...	1.0	...	1.0	...

<sup>†</sup> Reference category

<sup>‡</sup> Occupation, working hours, shift work, self-employment, age, marital status, presence of children in the household, personal income, education, heavy monthly drinking and low emotional support

\* Significantly different from estimate for reference category ( $p < 0.05$ )

... not applicable

Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

### Incident depression

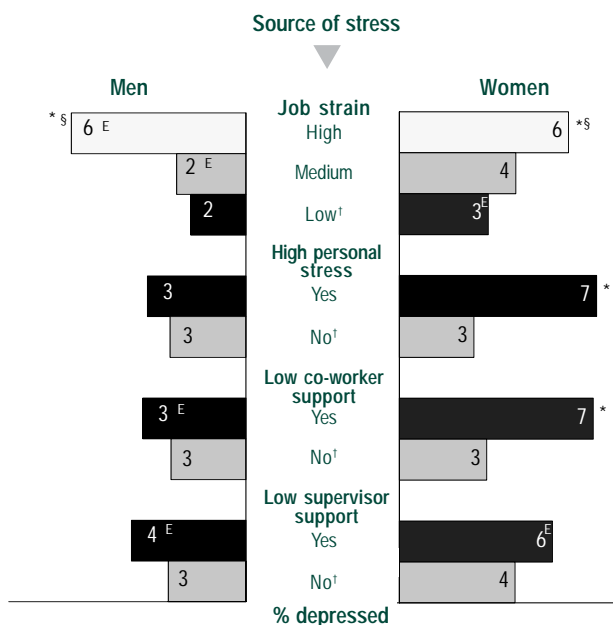
Longitudinal data from the NPHS were used to explore whether stress precedes depression (see *Defining stress and depression* and *Analytical techniques*). Two-year incident depression was defined as a report of depression among workers who had not reported depression two years previously. Questions to measure stress were asked in cycles 1 (1994/95) and 4 (2000/01) of the NPHS; therefore, incident depression in relation to stress could only be measured for the 1994/95-to-1996/97 and 2000/01-to-2002/03 periods.

For men, only one of the four sources of stress—job strain—was associated with new cases of depression (Chart 5). Men in high strain jobs were more than three times as likely as those in low strain

positions to have developed depression. For women, incident depression was associated with three sources of stress: high job strain, high personal stress, and low co-worker support.

These associations were examined in multivariate models controlling for employment and personal characteristics (Table 4). When all four stressors were controlled for simultaneously in addition to the other variables, the association between job strain and incident depression held for men, but not for women. For women, though, the associations between depression and high personal stress and low co-worker support did persist. These results are consistent with other research suggesting that men’s health is more vulnerable to job strain and women’s is placed at higher risk by stress arising from multiple roles and family situations.<sup>15,17,19</sup>

Chart 5  
Two-year incidence of depression, by sex and source of stress, employed population aged 18 to 75, Canada excluding territories, 1994/95 to 1996/97 and 2000/01 to 2002/03



<sup>†</sup> Reference category  
<sup>\*</sup> Significantly higher than estimate for reference category ( $p < 0.05$ )  
<sup>§</sup> Significantly higher than estimate for medium ( $p < 0.05$ )  
<sup>E</sup> Use with caution (coefficient of variation 16.6% to 33.3%)  
**Note:** An incident case of depression was defined as not having the condition in one NPHS cycle, but reporting it in the next. NPHS cycles 1 and 2 (1994/95 to 1996/97) and 4 and 5 (2000/01 to 2002/03) were examined.  
**Source:** 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)

A crucial issue in the study of associations between work stress and depression is whether depression is related to negative work situations or to the worker’s perception. Virtually all workers will find high strain jobs stressful. When stress levels and depression are determined using self-reported data, it is possible that negative personality traits may confound the relationship between stress and depression (see *Limitations*). It could be that people who have a negative outlook are more likely to think they have little control, find situations stressful and go on to experience depression. If this is the case, it is not the stressful situations that cause the depression, but the negative personality traits. Although negative affectivity was not measured in the NPHS, mastery, which is the degree to which people see themselves as being in control of their lives,<sup>30</sup> was measured. If depression is more closely associated with the characteristics of the worker than with stress, it would be expected that including mastery in the multivariate models would weaken or eliminate the observed associations between stress and depression. This was not the case. When mastery was included as a control variable, the odds ratios remained virtually unchanged (Table 4, final model).

Table 4

Unadjusted and adjusted odds ratios relating selected sources of stress to two-year incidence of depression, by sex, employed population aged 18 to 75, Canada excluding territories, 1994/95 to 1996/97 and 2000/01 to 2002/03

Source of stress	Unadjusted odds ratio	95% confidence interval	Controlling for employment and personal characteristics <sup>†</sup>		Controlling for employment and personal characteristics <sup>†</sup> and other three sources of stress		Controlling for employment and personal characteristics, <sup>‡</sup> other three sources of stress, and mastery		
			Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	
<b>Job strain</b>									
<b>Men</b>									
High	3.3*	1.9, 5.8	3.0*	1.6, 5.5	2.9*	1.6, 5.4	2.9*	1.5, 5.4	
Medium	1.3	0.8, 2.0	1.2	0.7, 2.0	1.2	0.7, 2.0	1.2	0.7, 2.0	
Low <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Women</b>									
High	2.0*	1.3, 3.0	1.6*	1.0, 2.5	1.3	0.8, 2.0	1.2	0.8, 1.9	
Medium	1.3	0.8, 2.1	1.2	0.8, 1.9	1.1	0.7, 1.7	1.1	0.7, 1.7	
Low <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>High personal stress</b>									
<b>Men</b>									
Yes	1.3	0.9, 2.0	1.1	0.7, 1.7	0.9	0.6, 1.5	0.9	0.6, 1.4	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Women</b>									
Yes	2.8*	2.1, 3.7	2.6*	1.9, 3.4	2.3*	1.7, 3.1	2.0*	1.5, 2.7	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Low co-worker support</b>									
<b>Men</b>									
Yes	1.4	0.8, 2.3	1.2	0.7, 2.0	1.1	0.6, 1.8	1.1	0.6, 1.8	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Women</b>									
Yes	2.3*	1.6, 3.3	2.1*	1.5, 3.1	1.9*	1.3, 2.7	1.8*	1.2, 2.6	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Low supervisor support</b>									
<b>Men</b>									
Yes	1.5	0.8, 2.7	1.4	0.8, 2.5	1.2	0.6, 2.3	1.2	0.6, 2.3	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	
<b>Women</b>									
Yes	1.3	0.9, 2.0	1.3	0.9, 1.9	0.9	0.6, 1.4	1.0	0.6, 1.4	
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...	

<sup>†</sup> Reference category

<sup>‡</sup> Occupation, working hours, shift work, self-employment, age, marital status, presence of children in the household, household income, education, heavy monthly drinking, low emotional support and smoking status

\* Significantly different from estimate for reference category ( $p < 0.05$ )

... not applicable

**Notes:** An incident case of depression was defined as not having the condition in one NPHS cycle but reporting it in the subsequent cycle. NPHS cycles 1 and 2 (1994/95 to 1996/97) and 4 and 5 (2000/01 to 2002/03) were examined. Because of rounding, an odds ratio for which the lower confidence interval was 1.0 was statistically significant.

**Source:** 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)

### Demands and latitude—interactive?

Most studies of job strain have clearly demonstrated that high levels are detrimental to health. However, exactly how the effects of psychological demands and decision latitude are associated with negative health outcomes is not as clear. If the effects interact, high psychological demands would be detrimental to health only if decision latitude were low; and if decision latitude were high, the health of workers facing high job demands would not be at risk.

To clarify this situation, psychological demands and decision latitude were entered into logistic regression models along with an interaction term. A negative interaction between psychological demands and decision latitude would indicate that increased psychological demands are more detrimental to workers with lower decision latitude.

In 2002, depression was positively associated with psychological demands and negatively with decision latitude for both sexes (Appendix Table A). The interaction term was *not* significant, indicating that decision latitude and job demands are associated with depression independently and in combination. This was also the case for women in the longer term (Appendix Table B); for men, however, the interaction was significant.

When looked at graphically, it is clear that, for both sexes, incident depression is most likely when their jobs present low decision latitude and high psychological demands (see charts). However, for men, psychological demands are not related to depression when decision

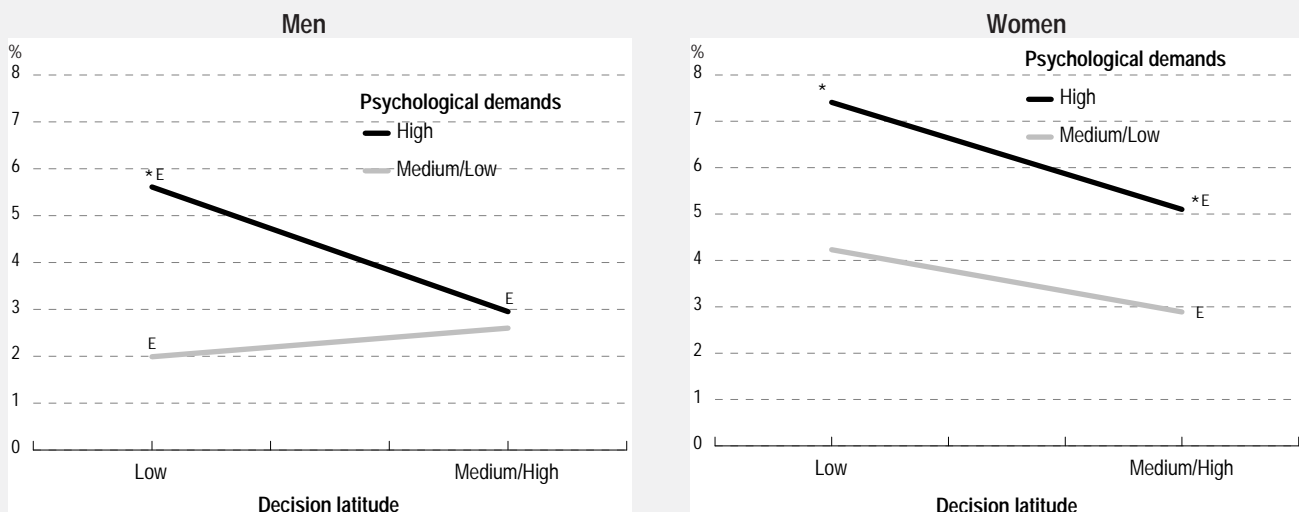
latitude is medium or high. For women, though, psychological demands still make a difference for higher levels of decision latitude.

Support from co-workers or supervisors may also modify associations between job strain and negative health outcomes; that is, support from co-workers or supervisors can buffer the deleterious effects of job strain.<sup>31</sup> To test this hypothesis, all regression models were rerun to test for interactions between job strain and co-worker support, and between job strain and supervisor support. Interactions between job strain and co-worker and supervisor support were not significant (data not shown), mirroring the results of other studies.<sup>10,11,13,17-20,22,25</sup> There was, however, evidence of a main effect for co-worker and supervisor support for both sexes in 2002. In other words, co-worker and supervisor support are beneficial regardless of job strain level. Using the longitudinal data, a main effect for co-worker support was found for women, but not men.

Another possibility is that stress at home may interact positively with job strain to create particularly deleterious conditions for mental health. The cross-sectional regression models were rerun to test for interactions between job strain and general stress, and the longitudinal models to test for interactions between job strain and personal stress. Again, none of the interaction terms was statistically significant (data not shown).

In all cases, continuous measures of stress were used when testing for interactions.

**Two-year incidence of depression, by psychological demands and decision latitude, employed population aged 18 to 75, Canada excluding territories, 1994/95 to 1996/97 and 2000/01 to 2002/03**



\* Significantly higher than estimate for medium/low psychological demands ( $p < 0.05$ )

<sup>E</sup> Use with caution (coefficient of variation 16.6% to 33.3%)

**Notes:** An incident case of depression was defined as not having the condition in one NPHS cycle, but reporting it in the next. NPHS cycles 1 and 2 (1994/95 to 1996/97) and 4 and 5 (2000/01 to 2002/03) were examined.

**Source:** 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)

### Persistent job strain

The 1994/95 NPHS and the 2002 CCHS asked identical questions to measure job strain, so with the cross-sectional files from each of these surveys, changes over time can be examined. For both sexes, average job strain levels were significantly lower in 2002 than in 1994/95 (Table 5). In 2002, 19% of men were classified as being in high strain jobs, down from 23%. The decline for women was even larger: from 35% to 27%. When the three components of job strain were considered, the decrease for men arose from a small decrease in psychological demands and an increase in skill discretion; for women, increases in both skill discretion and decision authority were behind the decline. Levels of perceived support from co-workers and supervisors remained stable (data not shown).

Using the NPHS longitudinal file, it was possible to determine the extent to which workers move in and out of high job strain. Longitudinal respondents were asked about job strain in 1994/95 and again in 2000/01, and the persistence of job strain was based on those who were employed in both interview periods. Of those who had been employed in 1994/95, 87% of men and 80% of women were employed at follow-up in 2000/01. Men who reported job strain in 1994/95 were less likely to be employed at follow-up in 2000/01, but for women, employment status at

follow-up was unrelated to job strain level in 1994/95 (data not shown).

Over one-quarter of the men (28%) who had reported high job strain in 1994/95 continued to experience it six years later. Persistent job strain was even more common for women (42%). Of the men classified as having low or medium strain in 1994/95, 13% reported high strain by 2000/01. A transition to high job strain was even more common among women (20%).

Few studies have assessed job strain at more than one point in time,<sup>11,31,37,55</sup> but the longitudinal NPHS offers a unique opportunity to study the effects of persistent exposure to high job strain. Based on exposure to high job strain in 1994/95 and/or 2000/01, four categories of workers were identified to reflect transitions into and out of high strain situations (Table 6). Depression in 2000/01 and 2002/03 was compared across these categories. Only workers who were free from depression in 1994/95 were considered, and men and women were combined for analysis because of small sample sizes.

Workers persistently exposed to high job strain were about three times as likely as those who had no such exposure to have experienced a major depressive episode in the year before the 2000/01 survey; the same was true for those who moved into high strain situations. By 2002/03, both of these groups continued to be at a higher risk of

Table 5  
Job strain scores by sex, employed population aged 18 to 75, Canada excluding territories, 1994/95 and 2002

	Men		Women	
	1994/95	2002	1994/95	2002
Average job strain score	0.94	0.90*	1.08	1.00*
High job strain (ratio 1.2 or higher) %	22.9	18.8*	34.7	26.6*
Medium job strain (ratio between 0.8 and 1.2) %	33.2	34.0	30.1	35.4*
Low job strain (ratio 0.8 or lower) %	43.9	47.1*	35.3	38.0*
<b>Job strain components</b>				
Psychological demands - average score	5.74	5.61*	5.96	5.85
Skill discretion - average score	6.09	6.31*	5.71	6.02*
Decision authority - average score	7.15	7.19	6.45	6.66*

\* Significantly different from estimate for 1994/95 ( $p < 0.05$ )  
Sources: 1994/95 National Population Health Survey, cross-sectional health file; 2002 Canadian Community Health Survey: Mental Health and Well-being

Table 6  
Percentage depressed in 2000/01 and 2002/03, by transitions in job strain, employed population aged 18 to 75 who were free from depression in 1994/95, Canada excluding territories

		Depression	
		2000/01	2002/03
		%	%
<b>High job strain in:</b>			
<b>1994/95</b>	<b>2000/01</b>		
Yes	Yes	7.4* <sup>E</sup>	9.3* <sup>E</sup>
Yes	No	3.5 <sup>E</sup>	4.0* <sup>E</sup>
No	Yes	7.0* <sup>E</sup>	7.2* <sup>E</sup>
No	No <sup>†</sup>	2.3	2.0

<sup>†</sup> Reference category  
\* Significantly different from estimate for reference category ( $p < 0.05$ )  
<sup>E</sup> Use with caution (coefficient of variation 16.6% to 33.3%)  
Source: 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)

Table 7  
Unadjusted and adjusted odds ratios relating transitions in job strain level to depression in 2000/01 and 2002/03, by sex, employed population aged 18 to 75 who were free from depression in 1994/95, Canada excluding territories

		Unadjusted odds ratio		Controlling for employment and personal characteristics <sup>†</sup>		Controlling for employment and personal characteristics <sup>†</sup> and four sources of stress <sup>§</sup>		Controlling for employment and personal characteristics <sup>†</sup> , four sources of stress <sup>§</sup> and mastery	
		Unadjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
----- Depression in 2000/01 -----									
High job strain in:									
1994/95	2000/01								
Yes	Yes	3.3*	2.1, 5.4	2.8*	1.7, 4.6	2.6*	1.5, 4.4	2.4*	1.4, 4.2
Yes	No	1.5	0.8, 2.7	1.4	0.7, 2.5	1.3	0.7, 2.4	1.3	0.7, 2.4
No	Yes	3.2*	1.9, 5.1	2.8*	1.7, 4.6	2.8*	1.7, 4.5	2.7*	1.6, 4.4
No	No <sup>‡</sup>	1.0	...	1.0	...	1.0	...	1.0	...
----- Depression in 2002/03 -----									
High job strain in:									
1994/95	2000/01								
Yes	Yes	5.1*	2.9, 8.9	3.6*	2.0, 6.5	3.6*	1.9, 6.6	3.4*	1.8, 6.4
Yes	No	2.1*	1.2, 3.8	1.6	0.9, 3.1	1.6	0.9, 3.0	1.6	0.9, 3.0
No	Yes	3.9*	2.0, 7.5	3.3*	1.8, 6.0	3.3*	1.8, 6.0	3.3*	1.8, 6.1
No	No <sup>‡</sup>	1.0	...	1.0	...	1.0	...	1.0	...

<sup>†</sup> Reference category (No in 1994/95 and No in 2000/01)

<sup>‡</sup> Occupation, working hours, shift work, self-employment, sex, age, marital status, presence of children in the household, household income, education, heavy monthly drinking, low emotional support and smoking status

<sup>§</sup> Job strain, high personal stress, low co-worker support and low supervisor support

\* Significantly different from estimate for reference category (p < 0.05)

... not applicable

Source: 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)

depression. In addition, those who no longer reported high strain in 2000/01 were twice as likely as the unexposed group to have depression in 2002/03.

When examined in multivariate models that controlled for employment and personal characteristics as well as other sources of stress and mastery, the finding that the persistently exposed group and the newly exposed group had an increased likelihood of depression remained (Table 7).

### Concluding remarks

Depression stands out as a major occupational health issue. According to the 2002 Canadian Community Health Survey: Mental Health and Well-being, just over 1 million adults aged 18 or older had experienced a major depressive episode in the year before their survey interview. More

than 70% of these individuals were employed during that year.

Stress on and off the job was associated with depression among workers. Men and women with jobs high in psychological demands, but with limited ability to use skills and authority to address these demands, had significantly higher rates of depression. The same was true for workers who felt a lack of support from their co-workers and supervisors, as well as for workers who generally perceived high levels of day-to-day stress. However, some evidence suggests that these stressors do not occur in isolation. When the various sources of stress were considered simultaneously along with other possible confounders, the association between low supervisor support and depression did not persist for either sex, nor did the association between job strain and depression for women.

Analysis based on longitudinal data revealed that stress is, at least in some cases, a precursor to depression. Incident depression was more likely for those in high strain jobs. For women, low co-worker support and high personal stress were also associated with incident depression. When the various sources of stress were considered

simultaneously, the only association that did not persist was high job strain for women.

These findings are consistent with other research, suggesting that the mental health of male workers is more vulnerable to stress arising from the work environment, while female workers are vulnerable to stress arising from multiple roles both on and off the job.<sup>15,17,19</sup> ●

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## Appendix

Table A

Odds ratios relating psychological demands and decision latitude to depression, by sex, employed population aged 18 to 75, Canada excluding territories, 2002

	Without interaction		With interaction	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Men</b>				
Psychological demands	1.16*	1.09, 1.24	1.16*	1.09, 1.24
Decision latitude	0.81*	0.74, 0.89	0.81*	0.74, 0.90
Interaction	...	...	1.00	0.96, 1.03
<b>Women</b>				
Psychological demands	1.08*	1.03, 1.14	1.08*	1.02, 1.14
Decision latitude	0.90*	0.84, 0.97	0.91*	0.84, 0.97
Interaction	...	...	0.99	0.97, 1.02

\* Significantly different from 1.00 ( $p < 0.05$ )

... not applicable

Source: 2002 Canadian Community Health Survey: Mental Health and Well-being

Table B

Odds ratios relating psychological demands and decision latitude to two-year incidence of depression, by sex, employed population aged 18 to 75, Canada excluding territories, 1994/95 to 1996/97 and 2000/01 to 2002/03

	Without interaction		With interaction	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Men</b>				
Psychological demands	1.19*	1.06, 1.34	1.19*	1.06, 1.34
Decision latitude	0.85*	0.74, 0.98	0.89	0.76, 1.04
Interaction	...	...	0.94*	0.88, 0.99
<b>Women</b>				
Psychological demands	1.14*	1.05, 1.23	1.15*	1.07, 1.23
Decision latitude	0.86*	0.76, 0.97	0.86*	0.75, 0.97
Interaction	...	...	1.01	0.97, 1.06

\* Significantly different from 1.00 ( $p < 0.05$ )

... not applicable

Note: An incident case of depression was defined as not having the condition in one cycle, but reporting it in the subsequent cycle. NPHS cycles 1 and 2 (1994/95 to 1996/97) and 4 and 5 (2000/01 to 2002/03) were examined.

Source: 1994/95 through 2002/03 National Population Health Survey, longitudinal Health file (square)