

# Long working hours and health

Margot Shields

## Abstract

### Objectives

This article examines associations between long working hours, depression and changes in selected health behaviours. Based on an analysis of people followed over a two-year period, the relationship between changes in work hours and changes in health behaviours is explored.

### Data source

The data are from the household longitudinal component of the 1994/95 and 1996/97 cycles of the National Population Health Survey, conducted by Statistics Canada. Results are based on 3,830 adult workers aged 25 to 54 (2,181 men and 1,649 women) who worked 35 hours or more per week throughout the year before their 1994/95 interview.

### Analytical techniques

Multivariate analyses were used to estimate associations between working hours and depression, and changes in weight, smoking, drinking and exercise, while controlling for potential socioeconomic and work-related confounders such as education, income, occupation, shift work and self-employment.

### Main results

Women who worked long hours had increased odds of subsequently experiencing depression. Moving from standard to long hours was associated with unhealthy weight gain for men, with an increase in smoking for both men and women, and with an increase in drinking for women. No associations were detected for physical activity.

### Keywords

weight gain, smoking, alcohol consumption, exercise, depression, work schedule tolerance

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In Canada, a growing share of the workforce is putting in long hours on the job (see *Working hours*).<sup>1-3</sup> Whether long hours adversely affect health has been debated for decades. However, policy-makers considering the regulation of working hours have had difficulty making decisions based on scientific research.<sup>4</sup>

In Japan, where long hours are common, a growing number of workers have been dying from cardiovascular causes (for instance, stroke, acute cardiac failure, myocardial infarction and aortic rupture) in their most productive years. Studies based on workers' compensation claims have found that many of the victims had been putting in long hours before they died.<sup>5,6</sup> The Japanese have named such deaths *Karoshi*, meaning "death from overwork."

Japanese researchers have proposed a *Karoshi* model to examine the relationship between long hours and cardiovascular disease.<sup>5</sup> It is hypothesized that long hours bring about unhealthy lifestyle changes such as smoking, alcohol abuse, lack of physical activity, sleeplessness, poor eating habits, and fewer chances for medical examinations. Prolonged periods of long hours may also increase anxiety, strain and irritability. Over time, individuals can become fatigued and develop a propensity toward obesity. The cumulative result can be cardiovascular disease.<sup>5</sup>

## Methods

### Data source

This article is based on data from the National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years. It covers household and institutional residents in all provinces and territories, except persons living on Indian reserves, on Canadian Force bases, and in some remote areas. The NPHS has both a longitudinal and cross-sectional component. Respondents who are part of the longitudinal component will be followed for up to 20 years.

Individual data are organized into two files: General and Health. Socio-demographic and some health information is collected for each member of participating households. These data are found in the General file. Additional in-depth health information is collected for one randomly selected household member. This additional information, as well as the information on the General file pertaining to that individual, is found in the Health file.

The 1994/95 NPHS provincial, non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate in the survey. After application of a screening rule (to improve the representativeness of the sample) 20,725 households remained in scope. In 18,342 of these households, the randomly selected person was aged 12 or older. Their response rate to the in-depth health questions was 96.1% or 17,626 respondents. Of these 17,626 randomly selected respondents, 14,786 were eligible members of the longitudinal panel. In addition, 468 selected respondents for whom only general information was collected in 1994/95 and 2,022 randomly selected respondents younger than 12 were also eligible. Thus, a total of 17,276 longitudinal respondents were eligible for re-interview in 1996/97. The remaining respondents to the 1994/95 survey were sponsored by provincial governments that elected to enlarge the sample size in their province for cycle 1 only. These respondents were not followed up.

A response rate of 93.6% was achieved for the longitudinal panel in 1996/97. Of these 16,168 respondents, full information was available for 15,670; that is, general and in-depth health information for both cycles of the survey.

A more detailed description of the NPHS design, sample and interview procedures can be found in published reports.<sup>7-9</sup>

The sample analyzed in this article consists of 3,830 respondents aged 25 to 54 (2,181 men and 1,649 women) who worked 35 hours per week or more throughout the entire year before their 1994/95 interview, and from whom information was collected in 1996/97 (Appendix Table A). A small percentage (0.9%) of respondents, for whom working hours in the year before the 1994/95 survey were not stated, was excluded. The profile of workers putting in long

hours in 1994/95 is based on the longitudinal file. Estimates based on the 1994/95 cross-sectional file are very similar (data not shown).

Every effort is made to collect the in-depth health information directly from the randomly selected individuals. However, in a small number of cases, proxy responses were accepted in both 1994/95 and 1996/97. Because the primary focus of this analysis is measurement of the change between the two NPHS cycles, the records for which a proxy response was accepted for the in-depth health interview in either cycle (4.4% of respondents) were not included: 8 respondents for whom only proxy information was available for both years; 151 with proxy information for 1994/95; and 18 with proxy information for 1996/97. These respondents were excluded to reduce potential bias that may have resulted from response errors due to proxy reporting.

### Analytical techniques

All analyses are based on weighted data. The group examined consists of longitudinal respondents for whom non-proxy information was available for both 1994/95 and 1996/97. Descriptive statistics for 25- to 54-year-olds who worked 35 hours per week or more throughout 1994/95 are presented. Those who worked long hours (an average of 41 or more hours per week) are compared with those who worked standard hours (an average of 35 to 40 hours).

Multiple logistic regression was used to model the relationship between long hours in 1994/95 and a subsequent depressive episode in 1996/97. Multiple logistic regression was also used to model the effects of changing or maintaining working hours between the two surveys (for example, moving from standard to long hours or working long hours in both survey periods) in relation to changes in health behaviours; namely, unhealthy weight gain, increased smoking, increased drinking, and reduced physical activity.

Based on face validity, a review of the literature on occupational stress,<sup>10,11</sup> and availability in the NPHS, selected work-related and socio-demographic factors were included in the regression models as control variables. Work-related variables were: occupation, self-employment, shift work, multiple jobs, high job strain, high job insecurity, and low supervisor support. Socio-demographic characteristics included age, marital status, educational attainment, household income and the presence of children younger than 12 in the household. Unless otherwise stated, the control variables in the regression models are based on data collected in the 1994/95 survey.

In all cases, separate regression models were fitted for men and women. Coefficients of variation and standard errors were estimated using a weighted bootstrap procedure<sup>12,13</sup> that fully accounts for the design effect of the survey.

Using longitudinal data from the first two cycles of the National Population Health Survey (1994/95 and 1996/97), this article examines Canadian workers aged 25 to 54 who worked at least 35 hours a week in 1994/95). People in this age range are the most likely to feel stress from the “time-crunch,” as they juggle work, family and personal responsibilities.<sup>14</sup>

The data are analyzed in the context of the early phases of the *Karoshi* model to determine if long hours (41 or more a week) are associated with depression and with changes in health behaviours. Four indicators—weight, smoking, drinking, and physical activity—are used to investigate if moving from standard to long hours is related to unhealthy lifestyle changes (see *Methods* and *Limitations*).

### Working hours and health

Surprisingly few studies have examined associations between working hours and health status and behaviours. Although the effects of shift work have been studied extensively, it is rare for research to focus on the quantity of hours.<sup>15</sup> Nonetheless, there is currently sufficient evidence to raise concerns

about the health and safety risks of working long hours.<sup>4,15,17</sup>

In North America and Europe, research has focused on the association between high job strain (high psychological demands coupled with low decision-making latitude<sup>11</sup>) and health outcomes such as depression, anxiety, migraine, high blood pressure and coronary heart disease,<sup>18-28</sup> and health behaviours such as smoking and excess body weight.<sup>29-31</sup> However, most research based on the job strain model has not explicitly examined the impact of the number of working hours.

While researchers in Japan have investigated the *Karoshi* phenomenon,<sup>5,6</sup> the data are, for the most part, presented as a series of cases studies; there are no epidemiologically sound estimates of the prevalence of *Karoshi*.<sup>6</sup> Other Japanese studies showing associations between long hours and weight gain, increased perceived stress, and an unhealthy lifestyle were based only on men in a small number of occupational groups.<sup>32,33</sup>

Among the few studies of the number of hours worked, a recent report by the Economic and Social Research Council in Great Britain concluded that

### Working hours

At the turn of the century, a typical worker in Canada put in a 60-hour week. In the following decades, largely as a result of union activity, efforts were made to reduce the length of the workweek in the interests of health and safety. It was widely argued that more opportunity for rest and time to participate more fully in family life would have a positive effect on workers' physical and mental health.<sup>6</sup> As a result, there was a general downturn in working hours, and the average workweek stabilized in the 35- to 40-hour range in the mid-1960s.

However, average weekly hours provide an incomplete picture. Although average hours worked per week have changed very little since the mid-1960s, a new trend has developed since the economic downturn of the early 1980s: “hours polarization.”<sup>1-3</sup> The proportions of male workers putting in both longer (41 or more) and shorter weekly hours (less than 35) have risen. Among female workers, a growing percentage work long hours. The proportion of the population working long hours is highest at ages 25 to 54, and the

shift out of standard to long hours has been the most skewed for women aged 35 to 54.<sup>3</sup>

**Percentage distribution of usual weekly hours, employees† aged 25 or older, by sex, Canada excluding territories, selected years 1980 to 1995**

	Usual weekly hours	1980	1985	1989	1995
		%			
Men	1-34	4.4	5.2	5.2	7.1
	35-40	77.5	75.0	73.4	68.6
	41+	18.0	19.7	21.4	24.3
Women	1-34	29.9	30.9	29.3	30.1
	35-40	64.5	62.6	63.4	61.3
	41+	5.6	6.5	7.3	8.6

Data source: Reference 3

† Excludes self-employed

long hours have negative health consequences.<sup>34</sup> Using data from the British Household Panel Study, the researchers found that working long hours a week increased feelings of stress and was associated with a decline in physical exercise. For women, several associations were found between long hours and health, including problems with arms, legs, hands, and blood pressure.

**Limitations**

To estimate working hours, respondents were asked about jobs they had over the previous year. They were asked their usual weekly working hours and the start and end dates for each job. It may have been difficult for some respondents to recall this information. Working hours may be underestimated for those who had a complex work history over the year, particularly if it involved multiple jobs.

Professionals and managers often work unpaid overtime to deal with excessive workloads. These workers may not report those additional hours, which would result in an underestimate of working hours for this group.

The calculation to derive average working hours was based on a maximum of three jobs. Consequently, working hours for individuals who had more than three jobs during the year would be underestimated. It is expected that this constraint had only a minimal impact on the analysis. Using 1994/95 NPHS cross-sectional data, it is estimated that less than 1% of workers had more than three jobs over the year. In 1996/97, details were only asked for a maximum of three jobs. The longitudinal file has details about a maximum of three jobs for both reference years.

It is not possible to have a complete picture of an individual's work situation because the NPHS is conducted every two years, and the questions about work pertain to the year before the date of the respondent's interview. For example, respondents classified as working standard hours both reference years may not have done so in the intervening year. This may have had an effect on the associations of changes observed between reference years.

The calculation of body mass index was based on self-reported data, and some respondents may have under-reported their weight and/or over-reported their height.

Respondents were classified as having experienced a "new" major depressive episode if they experienced depression in the year before the 1996/97 survey but not in the year before the 1994/95 survey. It is possible that these respondents may have had a history of depression; that is, they experienced depression before the NPHS began, or had an episode in the non-survey year.

The final stage of the *Karoshi* model—cardiovascular disease—has not been investigated extensively. Japanese research, based on case studies of small samples of male subjects, suggests an association between long working hours, high blood pressure and heart disease.<sup>35-37</sup> As well, one of these studies<sup>35</sup> detected a "U"-shaped relationship between long working hours and the risk of a heart attack: while men working more than 55 hours per week had increased odds of experiencing an attack, so did those working 35 hours per week or less,

**Measures of socio-demographic characteristics**

All measures of socio-demographic characteristics were derived using data collected in the 1994/95 survey.

To establish *marital status*, respondents were asked for their 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 classified as "never married," and "widowed," "separated" and "divorced" were categorized as "previously married."

Respondents were grouped into three *education* categories based on the highest level of education attained: high school graduation or less; some postsecondary; and postsecondary (college, trade or university) graduation.

*Household income* was defined based on the number of people in the household and total household income from all sources in the 12-month period before the survey.

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

compared with men who worked 40 to 45 hours per week. It may be that the men working shorter hours were doing so because of ill health.

Currently, small sample sizes preclude an examination of the relationship between long working hours and heart disease based on NPHS data. In the two years between the first and second NPHS cycles, for the population under study, the sample counts for the incidence of heart disease were 21 men and 13 women; for high blood pressure, the counts were 57 and 33, respectively.

### Workers putting in long hours

In 1994/95, among the population aged 25 to 54 working 35 hours or more per week, a higher percentage of men than women put in long hours (Table 1) (see *Measures of socio-demographic characteristics*). Half of these men reported 41 or more hours of work per week, compared with about one-quarter (28%) of their female counterparts. Men working long hours averaged 55 per week; women, 51 (data not shown). Among those working long hours, 32% of the men and 19% of the women put in at least 60 hours per week.

For men, long hours were more common at ages 25 to 34 and 35 to 44 than at age 45 or older. By contrast, for women, working long hours was not significantly related to age. Marital status was not associated with long hours for either male or female workers. However, men in households with young children were significantly more likely than other men to work long hours. For women, the proportion working long hours differed little by the presence of young children at home.

Postsecondary graduates were significantly more likely to work long hours, compared with workers whose formal education had not extended beyond high school. As well, men and women in high-income households were more likely than those in middle-income households to put in long hours. For men, long hours were also common among those in households with incomes in the low-to-middle range.

Table 1  
Percentage working long hours† among men and women aged 25 to 54 who worked 35 hours or more per week throughout 1994/95, by selected socio-demographic characteristics, Canada excluding territories

	Men		Women	
	Total number	Long hours†	Total number	Long hours†
	'000	%	'000	%
<b>Total</b>	<b>4,414</b>	<b>50‡</b>	<b>2,789</b>	<b>28</b>
<b>Age</b>				
25-34	1,489	52§	1,058	26
35-44	1,681	53§	1,093	28
45-54	1,244	43	638	30
<b>Marital status</b>				
Married	3,477	50	2,016	27
Never married	659	49	410	28
Previously married	278	47	360	32
Missing	--	--	--	--
<b>Child(ren) under age 12 in household</b>				
Yes	1,841	54††	1,043	25
No	2,573	47	1,746	29
<b>Education</b>				
Secondary graduation or less	1,439	45	778	23
Some postsecondary	1,086	50	734	26
Postsecondary graduation	1,880	53‡‡	1,272	32‡‡
Missing	--	--	--	--
<b>Household income</b>				
Lowest/Lower-middle/Middle	1,143	53§§	756	25
Upper-middle	1,978	44	1,255	25
Highest	1,064	58§§	691	35§§
Missing	229	49	87†††	26‡‡‡

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,181 male and 1,649 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97. A critical value of 2.40 instead of 1.96 was used when significance testing involved comparison of three groups within a variable. Because of rounding, detail may not add to totals.

† 41 or more hours per week

‡ Significantly higher than women

§ Significantly higher than ages 45-54

†† Significantly higher than no children in household

‡‡ Significantly higher than secondary graduation or less

§§ Significantly higher than upper-middle income group

††† Coefficient of variation between 16.6% and 25.0%

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

-- Amount too small to provide reliable estimate

## Measures of work characteristics

The data in this article dealing with occupation, self-employment, shift work and multiple job-holding were derived from the first, or 1994/95, cycle of the National Population Health Survey (NPHS).

*Occupation* was categorized as white-collar (administrative and professional); clerical, sales or service; and blue-collar, based on the 1980 Standard Occupational Classification (SOC) system.

Respondents were asked if they “worked mainly for others for wages, salary, or commission, or in their own business, farm or professional practice.” The latter were classified as *self-employed*. Unpaid family workers were excluded from the analysis (5 respondents).

Respondents who reported working anything but a regular daytime shift were coded as *shift workers* (including evening shift, night shift, rotating shift, split shift, irregular/on call schedule or other).

Some individuals had more than one job at the same time during the reference year. Those who held two or more jobs concurrently throughout 1994/95 were classified as *multiple job holders*.

When a respondent had more than one job during the reference year, the questions on occupation, self-employment, and shift work were asked about the job the respondent considered to be his or her main job.

For each job, respondents were asked how many hours per week they usually worked at that job. In addition, dates were collected for each job so that it was possible to calculate the number of weeks the respondent worked at the job during the year. With this information, the average number of hours worked per week during the reference year was calculated across all jobs. This was done for both reference years on the longitudinal file. Reference year 1994/95 is the year before the interview date of the 1994/95 survey, and reference year 1996/97 is the year before the interview date of the 1996/97 survey.

Individuals were classified as working standard hours if, on average, they worked 35 to 40 hours per week, and as working long hours if, on average, they worked 41 or more hours. The analysis in this article is based only on individuals who worked 35 or more hours per week throughout reference year 1994/95.

The pattern of *working hours* was examined across reference years by identifying the following categories:

- standard-standard: individuals who, on average, worked standard hours the entire year both reference years
- standard-long: individuals who worked the entire year both reference years, and who, on average, worked standard hours in reference year 1994/95 and long hours in reference year 1996/97
- standard-reduced: individuals who, on average, worked standard hours for the entire 1994/95 reference year, and

who reduced their hours to less than 35 per week or did not work all 52 weeks of reference year 1996/97

- long-long: individuals who, on average, worked long hours the entire year both reference years
- long-reduced: individuals who, on average, worked long hours for the entire 1994/95 reference year, and who reduced their hours to less than 41 per week or did not work all 52 weeks of reference year 1996/97

The questions on job strain, job insecurity, and supervisor support were asked in the 1994/95 survey about the job the respondent had at the time of the interview. To measure *job strain*, respondents were asked to rank their responses to the following seven statements using a 5-point scale ranging from “strongly agree” (a score of 1) to “strongly disagree” (a score of 5).

1. Your job requires that you learn new things (reverse score).
2. Your job requires a high level of skill (reverse score).
3. Your job allows you freedom to decide how you do your job (reverse score).
4. Your job requires that you do things over and over.
5. Your job is very hectic (reverse score).
6. You are free from conflicting demands that others make.
7. You have a lot to say about what happens in your job (reverse score).

Job strain was measured as the ratio of psychological demands (items 5 and 6) to decision latitude. Items pertaining to decision latitude include skill discretion (1, 2, and 4) and decision authority (3 and 7). So that the potential contribution of each item to the scores for decision latitude and psychological demands would be equal, the summed scores of 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 fell in the upper quartile of the distribution for the total working population (scores equal to or greater than 1.18), the respondent was categorized in a high-strain job. Cronbach's alpha was used to assess the internal consistency of the job strain scale. The internal consistency estimate was 0.61 for decision latitude and 0.34 for psychological demands of work.

*Job insecurity* was measured by the statement, “Your job security is good.” Respondents who replied “neither agree nor disagree,” “disagree,” or “strongly disagree” were categorized as experiencing job insecurity.

*Supervisor support* was measured by the statement, “Your supervisor is helpful in getting the job done.” Respondents who said they disagreed or strongly disagreed were categorized as receiving low support from their supervisor.

### Job characteristics

The propensity to work long hours was associated with several aspects of employment (see *Measures of work characteristics*). Men and women in white-collar occupations were more likely to report long hours than were those in clerical, sales and service

Table 2  
**Percentage working long hours<sup>†</sup> among men and women aged 25 to 54 who worked 35 hours or more per week throughout 1994/95, by selected employment characteristics, Canada excluding territories**

	Men		Women	
	Total number	Long hours <sup>†</sup>	Total number	Long hours <sup>†</sup>
	'000	%	'000	%
<b>Total</b>	<b>4,414</b>	<b>50<sup>‡</sup></b>	<b>2,789</b>	<b>28</b>
<b>Occupation</b>				
White-collar	1,487	56 <sup>§</sup>	1,193	35 <sup>§</sup>
Clerical/Sales/Service	875	46	1,192	22
Blue collar	1,843	45	275	17 <sup>††</sup>
Missing	209	59	130	35 <sup>††</sup>
<b>Self-employed</b>				
Yes	795	80 <sup>§</sup>	271	67 <sup>§</sup>
No	3,619	43	2,518	23
<b>Shift worker</b>				
Yes	976	57 <sup>§</sup>	380	36 <sup>§</sup>
No	3,438	48	2,409	26
<b>Multiple job holder</b>				
Yes	247	94 <sup>§</sup>	163	82 <sup>§</sup>
No	4,167	47	2,626	24
<b>High job strain</b>				
Yes	728	48	816	24
No	3,347	51	1,778	29
Missing	339	42	195	29 <sup>††</sup>
<b>High job insecurity</b>				
Yes	1,189	49	778	27
No	2,886	51	1,817	28
Missing	339	42	195	29 <sup>††</sup>
<b>Low supervisor support</b>				
Yes	724	52	444	27
No	3,351	50	2,151	28
Missing	339	42	195	29 <sup>††</sup>

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,181 male and 1,649 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97. A critical value of 2.40 instead of 1.96 was used when significance testing involved comparisons of three groups within a variable. Because of rounding, detail may not add to totals.

† 41 or more hours per week

‡ Significantly higher than women

§ Significantly higher than other item(s) in category

†† Coefficient of variation between 16.6% and 25.0%

-- Amount too small to provide reliable estimate

occupations or in blue-collar occupations (Table 2). High proportions of shift workers and individuals who were self-employed worked long hours. And not surprisingly, long hours were very common among individuals who worked at more than one job or business (94% for men and 82% for women).

However, high job strain, high job insecurity and low supervisor support were not related to working hours. Among individuals who reported these situations, there were no significant differences in the proportions working long versus standard hours.

### Changing hours

Most people who worked standard hours in 1994/95 continued to do so throughout 1996/97: 64% of men and 69% of women (Table 3). Men who worked long hours in 1994/95 were likely to continue in 1996/97 (66%). However, this was not the case for women; those who worked long hours in 1994/95 were about as likely to reduce their hours as they were to continue with long hours. And the percentage of men moving from standard to long hours was close to triple the corresponding percentage for women (21% versus 8%).

Table 3  
**Pattern of working hours between 1994/95 and 1996/97 among men and women aged 25 to 54 who worked 35 hours or more per week throughout 1994/95, Canada excluding territories**

	Men	Women
	%	
<b>Standard hours<sup>†</sup> in 1994/95</b>		
Continued standard hours in 1996/97	64 <sup>‡</sup>	69 <sup>‡</sup>
Moved to long hours in 1996/97	21 <sup>§</sup>	8
Reduced hours in 1996/97	15	23 <sup>††</sup>
<b>Long hours<sup>#</sup> in 1994/95</b>		
Continued long hours in 1996/97	66 <sup>‡</sup>	48
Reduced hours in 1996/97	34	52

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,164 male and 1,643 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 17 men and 6 women were excluded because of missing values for hours of work in 1996/97.

† 35 to 40 hours per week

‡ Significantly higher than other item(s) in category

§ Significantly higher than reduced hours

†† Significantly higher than moved to long hours

‡‡ 41 or more hours per week

## Depression

Previous studies have shown a number of mental health problems to be related to the work environment.<sup>18-24</sup> However, most of the emphasis has been on job strain, with little attention paid to working hours.

Of the population aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, 5% of women and 3% of men were classified as having experienced “a new” major depressive episode at

some time in the 12 months before their 1996/97 interview (Table 4) (see *Measures of health*). Women who worked long hours in 1994/95 had 2.2 times the odds of reporting having experienced a major depressive episode, compared with those who worked standard hours (Appendix Table B). For men, no relationship was found between depression and long working hours. However, consistent with numerous other studies, high job strain was related to depression for both sexes.<sup>18-24</sup>

## Measures of health

Using the methodology of Kessler et al.,<sup>38</sup> the National Population Health Survey defines a major depressive episode (MDE) with a subset of questions from the Composite International Diagnostic Interview. These questions cover a cluster of symptoms for depressive disorder, which are listed in the *Diagnostic and Statistical Manual of Mental Disorders*.<sup>39</sup> Responses to these questions were scored and transformed into a probability estimate of a diagnosis of MDE. If the estimate was 0.9 or more (that is, 90% certainty of a positive diagnosis), then the respondent was considered to have experienced an MDE in the previous 12 months. Respondents were classified as having experienced a new MDE if they experienced an MDE in the year before their 1996/97 interview, but not in the year before they were interviewed in 1994/95.

The Canadian Guidelines for Healthy Weights use body mass index (BMI) to determine an acceptable range of healthy weights and to identify conditions of excess weight and underweight.<sup>40</sup> BMI is calculated by dividing weight in kilograms by height in metres squared. Four weight categories are identified based on BMI:

- Underweight (BMI less than 20)
- Acceptable weight (BMI 20 to 24.9)
- Some excess weight (BMI 25 to 27)
- Overweight (BMI greater than 27).

These guidelines are recommended for everyone aged 20 to 64, excluding pregnant women. In accordance with these guidelines, for this analysis, individuals whose BMI was 25 or higher in 1994/95 were classified as having *excess body weight*.

The BMI scale is intended to be used as a “continuum” where the risk of developing health problems increases with shifts away from the “generally acceptable range.” Rapid changes within and between BMI categories should be considered as important indicators of potential problems.<sup>40</sup> To classify individuals as having an *unhealthy weight gain*, the average percentage gain was calculated separately for men and women between the two

reference years for individuals whose BMI was 20 or more in 1994/95. For men, the average gain was 0.7%, with a standard deviation of 5.7%. For women, the average gain was 1.2%, with a standard deviation of 7.6%. Individuals were then classified as having an unhealthy weight *gain* if their percentage weight gain between reference years was more than one standard deviation above the mean: more than 6.4% for men and more than 8.8% for women. People who were underweight in 1994/95 were not classified as having an unhealthy weight gain, regardless of how many pounds they had gained by 1996/97.

To classify smokers, the NPHS asked respondents if they currently smoked cigarettes daily, occasionally or not at all. Daily smokers were asked how many cigarettes they smoked each day. Respondents were identified as having *increased daily smoking* if they had been occasional or non-smokers in 1994/95 and had become daily smokers by 1996/97, or if they were daily smokers in both surveys and the number of cigarettes smoked per day increased by three or more (a pack a week) between the two surveys.

To measure *alcohol consumption*, respondents were asked the number of drinks they had on each day in the week before the survey. A drink was defined as one bottle of beer or a glass of draft, one glass of wine or a wine cooler, or one drink or cocktail with one and a half ounces of liquor. Respondents were classified as having increased their alcohol consumption if the number of drinks consumed in the week before the 1996/97 interview exceeded the number consumed before the 1994/95 interview.

The *frequency of physical activity* was based on the number of times in the previous three months that respondents had participated in a leisure-time physical activity that lasted more than 15 minutes. Monthly frequency was derived as the number of times in the past three months divided by 3. Respondents were considered to have decreased their physical activity if they reported fewer periods of exercise in 1996/97 than they had in 1994/95.



## Weight

Body mass index (BMI) is a measure of weight in relation to height. A BMI greater than 27 is associated with increased occurrence of hypertension, coronary heart disease and diabetes.<sup>40-42</sup> The 25-to-27 range is suggested as a caution zone that may lead to health problems in some people.

Among the group of workers examined in this analysis, a much higher proportion of men than women were overweight in 1994/95 (BMI greater than 27): 36% versus 23% (Table 4). Similarly, the

proportion of men having some excess weight (BMI 25 to 27) was close to double that for women: 25% compared with 13%. The men with excess weight (BMI 25 or higher) weighed, on average, 196 pounds (89 kilograms); the women averaged 168 pounds (76 kilograms).

When factors such as age, education, smoking status, occupation, shift work and work stress were taken into account, men who worked long hours in 1994/95 had increased odds (1.4) of having excess body weight (data not shown). Among women, this association was not found.

Between 1994/95 and 1996/97, the average weight gain for the group of workers analyzed in this article was minimal: about 1 pound (0.45 kilograms) for men and 2 pounds (0.91 kilograms) for women. Nevertheless, approximately 10% of both men and women had an unhealthy weight gain. The men gained an average of 19 pounds (8.6 kilograms); the women, 21 pounds (9.7 kilograms).

For men, moving from standard to long hours was associated with unhealthy weight gain (Chart 1).

Table 4  
Selected health indicators, men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, Canada excluding territories

	Men	Women
<b>New major depressive episode, 1996/97 (%)</b>	3 <sup>†</sup>	5 <sup>†</sup>
<b>Body mass index, 1994/95</b>		
Some excess weight (BMI 25 to 27) (%)	25 <sup>§</sup>	13
Overweight (BMI greater than 27) (%)	36 <sup>§</sup>	23
Average weight in pounds/kilograms 1994/95	180.7/82.0 <sup>§</sup>	141.7/64.3
Average weight in pounds/kilograms 1994/95 for individuals with excess weight (BMI 25 or higher)	195.7/88.8 <sup>§</sup>	167.6/76.0
<b>Weight gain, 1994/95 to 1996/97</b>		
Average % weight gain	0.9 <sup>‡</sup>	1.6 <sup>‡</sup>
Average gain in pounds/kilograms	1.2/0.5 <sup>††</sup>	2.0/0.9 <sup>‡</sup>
<b>Unhealthy weight gain</b>		
% with unhealthy weight gain	10	10
Average gain in pounds/kilograms	19.1/8.6	21.4/9.7
<b>Daily smoker, 1994/95 (%)</b>	28	25
<b>Increase in daily smoking, 1994/95 to 1996/97 (%)</b>		
Average increase (cigarettes per day)	9	7
<b>Increase in weekly alcohol consumption, 1994/95 to 1996/97 (%)</b>	34 <sup>§</sup>	25
Average increase (drinks per week)	6	3
<b>Decrease in periods of leisure-time physical activity, 1994/95 to 1996/97 (%)</b>		
Average decrease (periods per month)	43	41
	16 <sup>§</sup>	14

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Note:** Based on male and female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97. Excludes "missing."

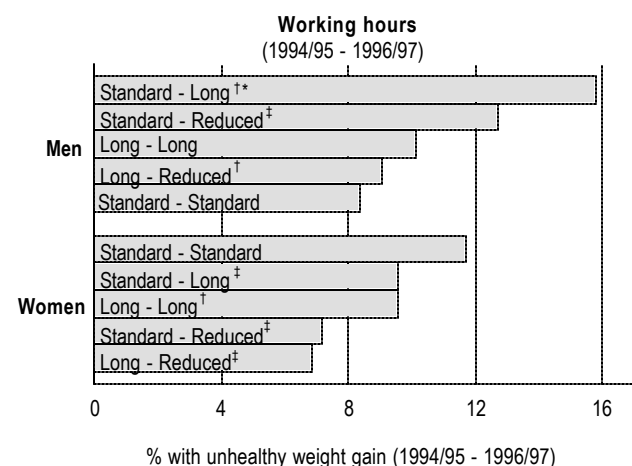
<sup>†</sup> Significantly higher than men ( $p = 0.05$ )

<sup>‡</sup> Coefficient of variation between 16.6% and 25.0%

<sup>§</sup> Significantly higher than women ( $p = 0.05$ )

<sup>††</sup> Coefficient of variation between 25.1% and 33.3%

Chart 1  
Percentage of men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95 and had unhealthy weight gain, by pattern of working hours between 1994/95 and 1996/97, Canada excluding territories



**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** For both men and women, a one-tailed test was carried out to determine if the outcome measure was higher for individuals who were standard - long, compared with those who were standard - standard. Significance testing was not done for other patterns of working hours.

<sup>†</sup> Coefficient of variation between 16.6% and 25.0%

<sup>‡</sup> Coefficient of variation between 25.1% and 33.3%

\* Significantly higher than standard - standard; one-tailed test,  $p = 0.05$

And even when factors such as age, education, smoking status, occupation, shift work and work stress were taken into account, men whose hours changed from standard to long had more than twice the odds (2.2) of experiencing an unhealthy weight gain, compared with men who continued to work standard hours (Appendix Table C). Among women, no significant associations were found between unhealthy weight gain and changes in working hours, although there was a significant relationship with job strain. Women classified as having high job strain in 1994/95 had increased odds (1.8) of experiencing an unhealthy weight gain by 1996/97.

### Smoking

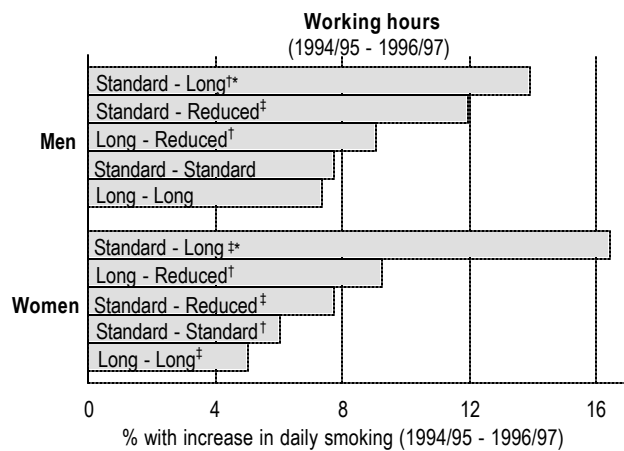
In 1994/95, 28% of the male and 25% of the female workers in this analysis were daily smokers (Table 4). There was, however, no relationship between working hours and the propensity to be a daily smoker in 1994/95 (data not shown). As well, unlike other studies that have found an association between

job strain and smoking,<sup>29,30</sup> this analysis found no significant relationship for either sex.

Between 1994/95 and 1996/97, 9% of the male and 7% of the female workers increased their daily smoking; that is, they either became daily smokers (after being non-smokers or occasional smokers) or increased the number of cigarettes they smoked per day by at least three (Table 4). Men who increased their smoking, smoked, on average, an additional 10 cigarettes per day; for women, the average daily increase was 8.

For both sexes, changing from standard to long hours was associated with increased smoking (Chart 2). But as is true for weight gain, factors such as age and education can affect smoking behaviour. Therefore, to understand the relationship between smoking and a change in working hours, this analysis takes these factors into consideration, along with other employment characteristics such as occupation, shift work and work stress. Men who changed from standard to long hours had more than twice the odds of an increase in daily smoking, compared with men who continued to work standard hours; the corresponding odds for women were more than four times higher (Appendix Table D).

Chart 2  
**Percentage of men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95 and had increase in daily smoking, by pattern of working hours between 1994/95 and 1996/97, Canada excluding territories**



**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** For both men and women, a one-tailed test was carried out to determine if the outcome measure was higher for individuals who were standard - long, compared with those who were standard - standard. Significance testing was not done for other patterns of working hours.

† Coefficient of variation between 16.6% and 25.0%

‡ Coefficient of variation between 25.1% and 33.3%

\* Significantly higher than standard - standard; one-tailed test, p = 0.05

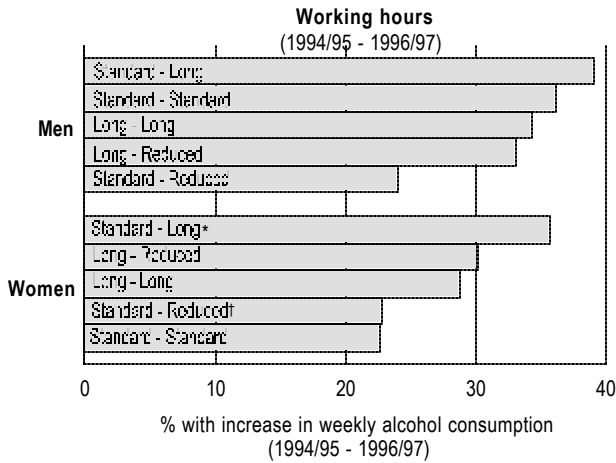
### Alcohol consumption

Between 1994/95 and 1996/97, 34% of the male workers and 25% of the female workers in this analysis increased their weekly alcohol consumption (Table 4). Men who increased their consumption had, on average, an additional six drinks per week, while women had, on average, three more drinks.

Among women, higher alcohol consumption was associated with changes in working hours (Chart 3). Those who moved from standard to long hours had higher odds of increased consumption, compared with those who continued to work standard hours (Appendix Table E). Women who had worked long hours in 1994/95 and subsequently reduced their hours also had high odds of increased drinking.

For men, an increase in weekly hours was not associated with consuming more alcohol. However, those who had worked standard hours in 1994/95 and reduced their hours by 1996/97 had significantly lower odds of increasing their alcohol consumption.

**Chart 3**  
**Percentage of men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95 and had increase in weekly alcohol consumption, by pattern of working hours between 1994/95 and 1996/97, Canada excluding territories**



**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** For both men and women, a one-tailed test was carried out to determine if the outcome measure was higher for individuals who were standard - long, compared with those who were standard - standard. Significance testing was not done for other patterns of working hours.

† Coefficient of variation between 16.6% and 25.0%

\* Significantly higher than standard - standard; one-tailed test,  $p = 0.05$

This might reflect health problems that could have prompted the reduction in hours of work. Male shift workers, too, had significantly low odds of reporting increased drinking.

### Physical activity

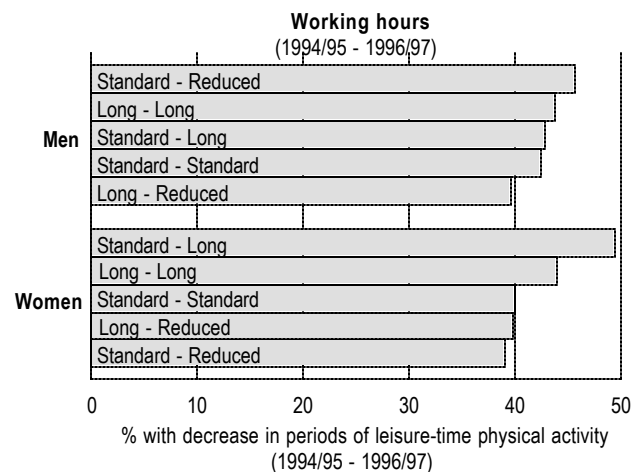
In 1994/95, the male workers included in this analysis exercised, on average, 19 times per month, while the female workers exercised 17 times per month. For both sexes, there were no significant differences in the average number of times exercising between those who worked standard and those who worked long hours (data not shown).

Between 1994/95 and 1996/97, 43% of men and 41% of women reduced the number of times they exercised. However, those who decreased their exercise tended to have had significantly higher levels to begin with: the men had exercised an average of 29 times per month in 1994/95, and the women, 27 times (data not shown). By 1996/97, these men and women had reduced their exercise level to an average of 13 times per month.

However, changes in working hours were not related to a decrease in physical activity (Chart 4). The odds that workers who moved from standard to long hours would report fewer periods of exercise were not significantly different from the odds for workers who continued with standard hours (Appendix Table F). Thus, among the four lifestyle consequences of long hours that are hypothesized by the *Karoshi* model and that are examined in this analysis, a reduction in physical activity is the only one not supported by NPHS data.

These findings are somewhat unexpected, as an increase in time on the job is likely to reduce the time available for exercise. As well, the lack of an association between hours of work and physical activity in the NPHS runs counter to the previously mentioned British study.<sup>34</sup> However, those researchers used a more detailed breakdown of hours of work, and detected an association between “excessively long hours” (60 or more a week) and lower levels of physical activity. Moreover, the British study did not report the relationship between changes in working hours and time devoted to physical activity.

**Chart 4**  
**Percentage of men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95 and experienced decrease in periods of leisure-time physical activity, by pattern of working hours between 1994/95 and 1996/97, Canada excluding territories**



**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** For both men and women, a one-tailed test was carried out to determine if the outcome measure was higher for individuals who were standard - long, compared with those who were standard - standard. Significance testing was not done for other patterns of working hours.

To further investigate the issue, a finer breakdown of working hours in the NPHS data was considered: standard (35 to 40 hours per week), somewhat long (41 to 59 hours), and excessively long (60 or more hours). Modest decreases in exercise levels were observed among women who moved from standard to somewhat long hours and among men who moved from somewhat long to excessively long hours. In all other cases, there were modest increases in exercise levels (data not shown). When the analysis was repeated eliminating those who did not exercise at all in 1994/95, the patterns were similar.

The inability to detect a significant association between an increase in working hours and a decrease in exercise levels may indicate that some respondents use exercise to cope with potential stressors associated with long working hours. However, a possible confounding factor may be seasonality. The time devoted to exercise varies throughout the year and tends to peak in the summer. NPHS respondents' activity levels were measured only once in each survey cycle, and individuals who increased their working hours from standard to long or somewhat long to 60 or more hours per week were more likely to have been interviewed in the summer.

### Concluding remarks

From the turn of the century to the 1960s, Canada experienced a decline in working hours, which led some economists to predict a 32-hour workweek.<sup>45</sup> This has not happened. In fact, the proportions of men and women putting in long hours have been rising since the early 1980s.<sup>3</sup>

In 1994/95, half of male and over a quarter of female full-time year-round workers spent at least 41 hours a week on the job. For both sexes, long hours were associated with high educational attainment, white-collar occupations, and predictably, self-employment, shift work, and multiple job holding. For men, long hours were also associated with being aged 25 to 44, having young children at home.

Relatively little research has been devoted to the health implications of working long hours. It is not yet known whether the Japanese *Karoshi* model can be applied to Canada. However, data from the

National Population Health Survey indicate that switching from standard to long hours between 1994/95 and 1996/97 increased the risk of certain negative health behaviours. Both men and women whose work schedules changed in this way had high odds of increased cigarette consumption, compared with workers who worked standard hours in both periods. Men who reported such a change in working hours had high odds of an unhealthy weight gain, compared with those who maintained standard hours. Women whose hours lengthened from standard to long had high odds of increased alcohol consumption, compared with women who continued with standard hours. In addition, women who worked long hours in 1994/95 had increased odds of subsequently experiencing depression, compared with those who worked standard hours.

In the future, as successive cycles of NPHS data become available, it will be possible to trace links between working hours and changes in lifestyle over a longer period. Associations with health outcomes in the final stages of the *Karoshi* model, such as high blood pressure and cardiovascular disease, can also be examined. ●

### References

- 1 Morissette R, Sunter D. *What is happening to weekly hours worked in Canada?* (Statistics Canada, Catalogue 11F0019MPE) 1994; 65.
- 2 Sunter D, Morissette R. The hours people work. *Perspectives on Labour and Income* (Statistics Canada, Catalogue 75-001) 1994; 6(3): 8-13.
- 3 Sheridan M, Sunter D, Diverty B. The changing workweek: Trends in weekly hours of work. *Canadian Economic Observer* (Statistics Canada, Catalogue 11-010-XPB) September 1996: 3.1-3.21.
- 4 Harrington JM. *Working long hours and health*. (British Medical Journal Supplement) Birmingham, England: Institute of Occupational Health, 1994: 1581-2.
- 5 Uehata T. Long working hours and occupational stress-related cardiovascular attacks among middle-aged workers in Japan. *Journal of Human Ergology* 1991; 20: 147-153.
- 6 Nishiyama K, Johnson JV. Karoshi—Death from overwork: Occupational health consequences of Japanese production management. *International Journal of Health Services* 1997 27(4): 625-41.
- 7 Tambay J-L, Catlin G. Sample design of the National Population Health Survey. *Health Reports* (Statistics Canada, Catalogue 82-003) 1995; 7(1): 29-38.

- 8 Swain L, Catlin G, Beaudet MP. The National Population Health Survey - its longitudinal nature. *Health Reports* (Statistics Canada, Catalogue 82-003) 1999; 10(4): 69-80.
- 9 National Population Health Survey, 1996/97. *Household Component, User's Guide for the Public Use Microdata Files* (Statistics Canada, Catalogue 82-M0009GPE) Ottawa: Statistics Canada, 1998.
- 10 Davidson MJ, Cooper CL. A model of occupational stress. *Journal of Occupational Medicine* 1981; 23(8): 564-74.
- 11 Karasek RA, Theorell T. *Healthy work: Stress, productivity and the reconstruction of working life*. New York: Basic Books, 1990.
- 12 Rao JNK, Wu CFJ, Yue K. Some recent work on resampling methods for complex surveys. *Survey Methodology* (Statistics Canada, Catalogue 12-001) 1992; 18(2): 209-17.
- 13 Rust KF, Rao JNK. Variance estimation for complex surveys using replication techniques. *Statistical Methods in Medical Research* 1996; 5: 283-310.
- 14 Frederick JA. *As time goes by... Time use of Canadians* (Statistics Canada, Catalogue 89-544) Ottawa: Statistics Canada, 1995.
- 15 Spurgeon A, Harrington JM, Cooper CL. Health and safety problems associated with long working hours: a review of the current position. *Occupational and Environmental Medicine* 1997; 54: 367-375.
- 16 Benimadhu P. *Hours of work: Trends and attitudes in Canada*. A Conference Board of Canada report from the Compensation Research Centre, Report 18-87. Ottawa, 1987.
- 17 World Health Organization Expert Committee. *Identification and control of work-related disease*. (WHO Technical Report No. 714), Geneva: World Health Organization, 1985.
- 18 Bourbonnais R, Brisson C, Moisan J, et al. Job strain and psychological distress in white-collar workers. *Scandinavian Journal of Work, Environment and Health* 1996; 22(2): 139-45.
- 19 Braun S, Hollander, RB. Work and depression among women in the Federal Republic of Germany. *Women and Health* 1988; 14(2): 3-26.
- 20 Karasek RA. Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly* 1979; 24: 285-308.
- 21 Landsbergis PA. Occupational stress among health care workers: A test of the job demands-control model. *Journal of Organizational Behaviour* 1988; 9: 217-39.
- 22 Lerner DJ, Levine S, Malspeis S, et al. Job strain and health-related quality of life in a national sample. *American Journal of Public Health* 1994; 84(10): 1580-5.
- 23 Williams RB, Barefoot JC, Blumenthal JA, et al. Psychosocial correlates of job strain in a sample of working women. *Archives of General Psychiatry* 1997; 54: 543-8.
- 24 Stansfeld SA, Fuhrer R, Head J, et al. Work and psychiatric disorder in the Whitehall II study. *Journal of Psychosomatic Research* 1997; 43(1): 73-81.
- 25 Light KC, Turner JR, Hinderliter AL. Job strain and ambulatory work blood pressure in healthy young men and women. *Hypertension* 1992; 20(2): 214-8.
- 26 Bosma H, Marmot MG, Hemingway H, et al. Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *British Medical Journal* 1997; 314: 558-65.
- 27 Karasek R, Baker D, Marxer F, et al. Job decision latitude, job demands, and cardiovascular disease: a prospective study of Swedish men. *American Journal of Public Health* 1981; 71(7) 694-705.
- 28 Wilkins K, Beaudet MP. Work stress and health. *Health Reports* (Statistics Canada, Catalogue 82-003) 1998; 10(3): 47-62.
- 29 Hellerstedt WL, Jeffery RW. The association of job strain and health behaviours in men and women. *International Journal of Epidemiology* 1997; 26(3) 575-583.
- 30 Green KL, Johnson JV. The effects of psychosocial work organization on patterns of cigarette smoking among male chemical plant employees. *American Journal of Public Health* 1990; 80(11) 1368-71.
- 31 Karasek R, Gardell B, Lindell J. Work and non-work correlates of illness and behaviour in male and female Swedish white collar workers. *Journal of Occupational Behaviour* 1987; 8: 187-207.
- 32 Nakamura K, Shimai S, Kikuchi S, et al. Increases in body mass index and waist circumference as outcomes of working overtime. *Occupational Medicine* 1998; 48(3): 169-173.
- 33 Maruyama S, Morimoto K. Effects of long workhours on life-style, stress and quality of life among intermediate Japanese managers. *Scandinavian Journal of Work, Environment and Health* 1996; 22(5): 353-59.
- 34 Sease R, Scales J. *Work now - pay later? The impact of long work hours on health and family life*. (Technical Paper No. 17) Colchester, England: Institute for Social and Economic Research, 1998.
- 35 Sokejima S, Kagamimori S. Working hours as a risk factor for acute myocardial infarction in Japan: case control study. *British Medical Journal* 1998; 317: 775-80.
- 36 Hayashi T, Kobayashi Y, Yamaoka K, et al. Effect of overtime work on 24-hour ambulatory blood pressure. *Journal of Occupational and Environmental Medicine* 1996; 38(10): 1007-11.
- 37 Iwasaki K, Sasaki T, Oka T, et al. Effect of working hours on biological functions related to cardiovascular system among salesmen in a machinery manufacturing company. *Industrial Health* 1998; 36: 361-7.
- 38 Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the national comorbidity survey. *Archives of General Psychiatry* 1994; 51(1): 8-19.
- 39 American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 3<sup>rd</sup> rev. ed. Washington, D.C.: American Psychiatric Association, 1987.
- 40 National Health and Welfare. *Canadian Guidelines for Healthy Weights*. Report of an Expert Group convened by Health Promotion Directorate, Health Services and Promotion Branch. Ottawa: Minister of National Health and Welfare, 1988.
- 41 Reeder BA, Angel A, Ledoux M, et al. Obesity and its relation to cardiovascular disease risk factors in Canadian adults. *Canadian Medical Association Journal* 1992; 146(11): 2009-19.
- 42 Gilmore J. Body mass index and health. *Health Reports* (Statistics Canada, Catalogue 82-003) 1999; 11(1): 31-43.
- 43 Hameed SMA. Four day, 32 hour work week: Analysis and prospects. In: *Three or Four Work Day Work Week*, edited by SMA Hameed and GS Paul, 5-30. Edmonton: Faculty of Business Administration, The University of Alberta, 1974.

## Appendix

Table A  
Longitudinal sample aged 25 to 54 working 35 or more hours per week throughout 1994/95, by sex, Canada excluding territories

	Men	Women
<b>Total</b>	2,181	1,649
<b>Occupation</b>		
White-collar	728	723
Clerical/Sales/Service	412	714
Blue collar	954	133
Missing	87	79
<b>Self-employed</b>		
Yes	392	147
No	1,789	1,502
<b>Shift worker</b>		
Yes	508	248
No	1,673	1,401
<b>Multiple job holder</b>		
Yes	139	98
No	2,042	1,551
<b>High job strain</b>		
Yes	365	485
No	1,696	1,070
Missing	120	94
<b>High job insecurity</b>		
Yes	594	466
No	1,467	1,089
Missing	120	94
<b>Low supervisor support</b>		
Yes	357	258
No	1,704	1,297
Missing	120	94
<b>Age</b>		
25-34	754	622
35-44	799	619
45-54	628	408
<b>Education</b>		
Secondary graduation or less	735	426
Some postsecondary	521	446
Postsecondary graduation	921	775
Missing	4	2
<b>Marital status</b>		
Married	1,574	1,056
Never married	391	302
Previously married	216	290
Missing	--	1
<b>Child(ren) under age 12 in household</b>		
Yes	775	557
No	1,406	1,092
<b>Household income</b>		
Lowest/Lower-middle/Middle	590	487
Upper-middle	1,039	794
Highest	458	324
Missing	94	44

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Note:** Includes only longitudinal respondents for whom non-proxy 1994/95 and 1996/97 information was available.

-- Nil

Table B  
Adjusted odds ratios relating selected characteristics to probability of major depressive episode in 1996/97 among men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, Canada excluding territories

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Longworkinghours <sup>†</sup>	0.6	0.3, 1.3	2.2*	1.1, 4.4
White-collar <sup>†</sup>	0.5	0.2, 1.4	1.6	0.8, 3.1
Self-employed <sup>†</sup>	--	...	0.2	0.0, 3.2
Shift worker <sup>†</sup>	0.7	0.3, 1.6	2.3	0.9, 6.0
Multiple job holder <sup>†</sup>	--	...	--	...
<b>Work stress</b>				
High job strain <sup>†</sup>	3.3*	1.3, 8.5	2.1*	1.1, 4.0
High job insecurity <sup>†</sup>	1.6	0.7, 4.1	1.0	0.5, 1.9
Low supervisor support <sup>‡</sup>	0.6	0.0, 26.5	1.4	0.7, 2.9
<b>Age</b>				
25-34 <sup>‡</sup>	1.0	...	1.0	...
35-44	1.0	0.3, 2.7	0.8	0.4, 1.6
45-54	0.9	0.2, 3.1	0.9	0.3, 2.5
Married <sup>†</sup>	0.8	0.2, 2.6	0.9	0.4, 2.1
<b>Child(ren) under age 12 in household<sup>†</sup></b>	2.6	0.8, 8.0	1.4	0.6, 3.3
<b>Education</b>				
Secondary graduation or less <sup>‡</sup>	1.0	...	1.0	...
Some postsecondary	0.5	0.1, 1.7	0.3*	0.1, 0.8
Postsecondary graduation	0.5	0.2, 1.2	0.5	0.3, 1.0
<b>Household income</b>				
Lowest/Lower-middle/Middle	0.2*	0.0, 0.7	1.8	0.6, 5.3
Upper-middle	0.3*	0.1, 0.9	1.7	0.7, 4.3
Highest <sup>‡</sup>	1.0	...	1.0	...

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,151 male and 1,632 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 46 men and 75 women were categorized as having a major depressive episode in reference year 1996/97. "Missing" categories for occupation, income and work stress variables were included in the model to maximize sample size; however, their respective odds ratios are not shown. Unless otherwise noted, all characteristics refer to 1994/95.

<sup>†</sup> Reference category is absence of characteristic; for example, the reference category for long working hours is standard working hours.

<sup>‡</sup> Reference category for which odds ratio is always 1.0

-- Sample counts were very low for the number of individuals experiencing a major depressive episode for certain variables in the models; namely self-employed men (4), men with multiple jobs (4) and women with multiple jobs (5). This resulted in instability in the regression models and, therefore, these variables were removed from the models. The conclusions based on the analysis were similar regardless of whether these variables were included.

\* p £ 0.05

... Not appropriate

**Table C**  
Adjusted odds ratios relating selected characteristics to unhealthy weight gain between 1994/95 and 1996/97 among men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, Canada excluding territories

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Working hours (1994/95 - 1996/97)</b>				
Standard - standard†	1.0	...	1.0	...
Standard - long	2.2*	1.2, 4.0	0.8	0.3, 2.2
Standard - reduced	1.5	0.7, 3.4	0.6	0.2, 1.3
Long - long	1.3	0.8, 2.1	0.9	0.4, 1.9
Long - reduced	1.2	0.6, 2.1	0.5	0.2, 1.1
<b>Occupation</b>				
White-collar‡	0.7	0.4, 1.0	0.7	0.4, 1.2
<b>Self-employed‡</b>	1.0	0.6, 1.7	0.8	0.3, 2.1
<b>Shift worker‡</b>	1.3	0.8, 1.9	1.6	0.9, 3.1
<b>Multiple job holder‡</b>	1.0	0.5, 1.9	1.7	0.6, 4.7
<b>Work stress</b>				
High job strain‡	1.0	0.6, 1.7	1.8*	1.0, 3.2
High job insecurity ‡	1.3	0.8, 1.9	0.9	0.5, 1.5
Low supervisor support‡	0.9	0.6, 1.5	1.1	0.6, 2.3
<b>Age</b>				
25-34†	1.0	...	1.0	...
35-44	1.1	0.8, 1.7	0.9	0.5, 1.6
45-54	0.8	0.5, 1.2	0.6	0.3, 1.3
<b>Married‡</b>	0.6	0.4, 1.0	0.9	0.5, 1.5
<b>Child(ren) under age 12 in household‡</b>	0.8	0.5, 1.2	0.9	0.5, 1.7
<b>Education</b>				
Secondary graduation or less†	1.0	...	1.0	...
Some postsecondary	0.8	0.5, 1.3	0.7	0.3, 1.3
Postsecondary graduation	1.0	0.6, 1.5	0.9	0.4, 1.8
<b>Household income</b>				
Lowest/Lower-middle/Middle	0.8	0.4, 1.5	2.0	0.8, 4.6
Upper-middle	1.0	0.6, 1.6	1.2	0.6, 2.6
Highest‡	1.0	...	1.0	...
<b>Daily smoker (1996/97)‡</b>	0.7	0.4, 1.1	0.6	0.3, 1.2

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,134 male and 1,512 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 228 men and 144 women were categorized as having an unhealthy weight gain between reference years. "Missing" categories for occupation, income and work stress were included in the model to maximize sample size; however, their respective odds ratios are not shown. Because of rounding, some confidence intervals with 1.0 as the lower limit were significant. Unless otherwise noted, all characteristics refer to 1994/95.

† Reference category, for which odds ratio is always 1.0

‡ Reference category is absence of characteristic; for example, the reference category for self-employed is paid worker.

\* p £ 0.05

... Not appropriate

**Table D**  
Adjusted odds ratios relating selected characteristics to increased daily smoking between 1994/95 and 1996/97 among men and women aged 25 to 54 who worked 35 more hours per week throughout 1994/95, Canada excluding territories

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Working hours (1994/95 - 1996/97)</b>				
Long - long	1.1	0.6, 2.0	1.0	0.3, 2.9
Standard - long	2.2*	1.1, 4.5	4.1*	1.4, 11.6
Long - reduced	1.2	0.6, 2.3	1.7	0.8, 4.0
Standard - reduced	1.7	0.7, 4.2	1.3	0.6, 2.8
Standard - standard†	1.0	...	1.0	...
<b>Occupation</b>				
White-collar‡	0.6	0.3, 1.0	0.4*	0.2, 0.8
<b>Self-employed‡</b>	0.5*	0.3, 0.9	0.9	0.3, 2.4
<b>Shift worker‡</b>	1.0	0.6, 1.9	1.3	0.5, 3.1
<b>Multiple job holder‡</b>	1.5	0.6, 3.9	1.2	0.4, 3.8
<b>Work stress</b>				
High job strain‡	1.0	0.6, 1.7	0.9	0.5, 1.6
High job insecurity ‡	0.7	0.4, 1.1	1.4	0.8, 2.3
Low supervisor support‡	0.9	0.5, 1.6	1.3	0.7, 2.7
<b>Age</b>				
25-34†	1.0	...	1.0	...
35-44	0.7	0.4, 1.2	0.9	0.5, 1.8
45-54	0.6	0.3, 1.1	0.9	0.4, 2.1
<b>Married‡</b>	0.9	0.5, 1.6	0.5*	0.3, 0.9
<b>Child(ren) under age 12 in household‡</b>	1.0	0.6, 1.7	1.2	0.6, 2.3
<b>Education</b>				
Secondary graduation or less†	1.0	...	1.0	...
Some postsecondary	1.0	0.6, 1.7	0.5	0.3, 1.1
Postsecondary graduation	0.5*	0.3, 0.9	0.4*	0.2, 0.7
<b>Household income</b>				
Lowest/Lower-middle/Middle	0.9	0.5, 1.7	0.6	0.2, 1.4
Upper-middle	0.9	0.5, 1.6	0.7	0.3, 1.6
Highest‡	1.0	...	1.0	...

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,156 male and 1,637 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 189 men and 118 women had increased their smoking between reference years. "Missing" categories for occupation, income and work stress variables were included in the model to maximize sample size; however, their respective odds ratios are not shown. Unless otherwise noted, all characteristics refer to 1994/95.

† Reference category for which odds ratio is always 1.0

‡ Reference category is the absence of characteristic; for example, the reference category for self-employed is paid worker.

\* p £ 0.05

... Not appropriate

Table E

Adjusted odds ratios relating selected characteristics to increased weekly alcohol consumption between 1994/95 and 1996/97 among men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, Canada excluding territories

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Working hours (1994/95 - 1996/97)</b>				
Long - long	0.9	0.6, 1.3	1.5	0.9, 2.5
Standard - long	1.1	0.7, 1.7	2.0*	1.1, 3.4
Long - reduced	0.8	0.6, 1.3	1.6*	1.0, 2.6
Standard - reduced	0.5*	0.3, 0.9	1.0	0.6, 1.5
Standard - standard†	1.0	---	1.0	---
<b>Occupation</b>				
White-collar‡	0.9	0.7, 1.2	1.0	0.7, 1.4
<b>Self-employed‡</b>	1.1	0.8, 1.5	0.9	0.5, 1.7
<b>Shift worker‡</b>	0.7*	0.5, 1.0	0.9	0.6, 1.5
<b>Multiple job holder‡</b>	1.0	0.6, 1.9	0.6	0.3, 1.3
<b>Work stress</b>				
High job strain‡	1.1	0.8, 1.6	1.0	0.7, 1.4
High job insecurity ‡	0.9	0.7, 1.2	1.1	0.7, 1.5
Low supervisor support‡	1.1	0.8, 1.6	1.1	0.7, 1.7
<b>Age</b>				
25-34†	1.0	---	1.0	---
35-44	1.0	0.7, 1.3	0.7	0.5, 1.0
45-54	0.7	0.5, 1.0	0.9	0.6, 1.4
<b>Married‡</b>	0.9	0.7, 1.3	1.1	0.8, 1.5
<b>Child(ren) under age 12 in household‡</b>	1.1	0.8, 1.5	0.8	0.5, 1.1
<b>Education</b>				
Secondary graduation or less†	1.0	---	1.0	---
Some postsecondary	0.8	0.6, 1.1	1.0	0.7, 1.6
Postsecondary graduation	0.8	0.6, 1.0	1.2	0.7, 1.9
<b>Household income</b>				
Lowest/Lower-middle/Middle	0.8	0.5, 1.2	1.2	0.7, 2.1
Upper-middle	0.9	0.7, 1.3	1.2	0.8, 1.9
Highest‡	1.0	---	1.0	---

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,120 male and 1,626 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 696 men and 408 women increased their weekly alcohol consumption between reference years. "Missing" categories for occupation, income and work stress variables were included in the model to maximize sample size; however, their respective odds ratios are not shown. Because of rounding, some confidence intervals with 1.0 as the lower/upper limit were significant. Unless otherwise noted, all characteristics refer to 1994/95.

† Reference category for which odds ratio is always 1.0

‡ Reference category is the absence of characteristic; for example, the reference category for self-employed is paid worker.

\*  $p \leq 0.05$

--- Not appropriate

Table F

Adjusted odds ratios relating selected characteristics to decreased physical activity between 1994/95 and 1996/97 among men and women aged 25 to 54 who worked 35 or more hours per week throughout 1994/95, Canada excluding territories

	Men		Women	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
<b>Working hours (1994/95 - 1996/97)</b>				
Long - long	1.1	0.8, 1.4	1.1	0.7, 1.7
Standard - long	1.0	0.7, 1.6	1.4	0.8, 2.3
Long - reduced	0.9	0.7, 1.3	0.9	0.6, 1.4
Standard - reduced	1.2	0.7, 1.9	1.0	0.6, 1.5
Standard - standard†	1.0	---	1.0	---
<b>Occupation</b>				
White-collar‡	0.9	0.7, 1.2	1.0	0.7, 1.4
<b>Self-employed‡</b>	1.1	0.8, 1.5	1.1	0.7, 1.9
<b>Shift worker‡</b>	1.0	0.7, 1.2	0.9	0.6, 1.4
<b>Multiple job holder‡</b>	0.9	0.6, 1.5	1.0	0.5, 1.8
<b>Work stress</b>				
High job strain‡	1.0	0.7, 1.4	0.8	0.6, 1.2
High job insecurity ‡	1.1	0.8, 1.4	0.9	0.7, 1.2
Low supervisor support‡	0.9	0.7, 1.3	1.0	0.7, 1.5
<b>Age</b>				
25-34†	1.0	---	1.0	---
35-44	0.9	0.7, 1.2	0.9	0.7, 1.3
45-54	1.1	0.8, 1.4	0.8	0.6, 1.2
<b>Married‡</b>	1.0	0.7, 1.3	0.9	0.6, 1.2
<b>Child(ren) under age 12 in household‡</b>	1.1	0.8, 1.4	1.0	0.7, 1.3
<b>Education</b>				
Secondary graduation or less†	1.0	---	1.0	---
Some postsecondary	1.0	0.7, 1.3	1.1	0.8, 1.7
Postsecondary graduation	1.0	0.8, 1.4	1.1	0.8, 1.6
<b>Household income</b>				
Lowest/Lower-middle/Middle	0.8	0.6, 1.2	1.0	0.6, 1.5
Upper-middle	1.2	0.9, 1.6	0.7	0.5, 1.0
Highest‡	1.0	---	1.0	---

**Data source:** 1994/95 and 1996/97 National Population Health Survey, longitudinal sample, Health file

**Notes:** Based on 2,153 male and 1,635 female longitudinal respondents for whom non-proxy information was available for 1994/95 and 1996/97; 952 men and 655 women decreased their physical activity between reference years. "Missing" categories for occupation, income and work stress variables were included in the model to maximize sample size; however, their respective odds ratios are not shown. Unless otherwise noted, all characteristics refer to 1994/95.

† Reference category for which odds ratio is always 1.0

‡ Reference category is the absence of characteristic; for example, the reference category for self-employed is paid worker.

--- Not appropriate