

Long working hours and health

Margot Shields

A growing share of the workforce is putting in long hours on the job (see *Working hours*). 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 (Harrington, 1994).

In Japan, where long working hours are common, a growing number of workers have been dying from cardiovascular causes 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 (Uehata, 1991; Nishiyama and Johnson, 1997). 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 (Uehata, 1991). 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 working long hours may increase anxiety, strain and irritability. Over time, people can become fatigued and develop a propensity to obesity. The cumulative effect may be cardiovascular disease.

Using longitudinal data from the first two cycles of the National Population Health Survey (NPHS) (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 (Frederick, 1995).

Adapted from an article in Health Reports (Statistics Canada, Catalogue no. 82-003-XPB) 11, no. 2 (Autumn 1999). Margot Shields is with the Health Statistics Division. She can be reached at (613) 951-4177 or shiemar@statcan.ca.

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 work week 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 (Benimadhu, 1987). As a result, there was a general downturn in working hours, and the average work week 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" (Morissette and Sunter, 1994; Sunter and Morissette, 1994; Sheridan, Sunter and Diverty, 1996). 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 (Sheridan, Sunter and Diverty, 1996).

Distribution of usual weekly hours, employees aged 25 and over, by sex

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

Source: Labour Force Survey

The data are analyzed in the context of the early phases of the *Karoshi* model to determine whether 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 whether moving from standard to long hours is related to unhealthful life-style changes (see *Data source 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 (Spurgeon, Harrington and Cooper, 1997). Nonetheless, sufficient evidence exists to raise concerns about the health and safety risks of working long hours (Harrington, 1994; Spurgeon, Harrington and Cooper, 1997; World Health Organization, 1985.)

In North America and Europe, research has focused on the association between high job strain (high psychological demands coupled with low decision-making latitude [Karasek and Theorell, 1990]) and health outcomes such as depression, anxiety, migraines, high blood pressure and coronary heart disease (Karasek, 1979; Karasek et al., 1981; Lerner et al., 1994; Wilkins and Beaudet, 1998), and health behaviours such as smoking and excess body weight (Hellerstedt and Jeffery, 1997). However, most research based on the job strain model has not explicitly examined the effect of the number of working hours.

Among the few studies on number of hours worked, a recent report by the Economic and Social Research Council in Great Britain concluded that long hours did have negative health consequences (Sease and Scales, 1998). Researchers found that working long hours increased feelings of stress and was associated with a decline in physical exercise. For women, long hours were associated with several conditions, including problems with arms, legs, hands, and blood pressure.

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 (Sokejima and Kagamimori, 1998; Hayashi et al., 1996; Iwasaki et al., 1998).

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. Half of the men reported 41 or more hours of work per week, compared with about one-quarter (28%) of their female counterparts (Table 1). Men working long hours averaged 55 per week; women, 51. 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

Table 1: Persons who worked 35 hours or more per week throughout 1994-95, by selected characteristics

	Men		Women	
	Total	Long hours*	Total	Long hours*
	'000	%	'000	%
Total	4,414	50	2,789	28
Age				
25 to 34	1,489	52	1,058	26
35 to 44	1,681	53	1,093	28
45 to 54	1,244	43	638	30
Marital status				
Married	3,477	50	2,016	27
Never-married	659	49	410	28
Previously married	278	47	360	32
Child(ren) under age 12 in household				
Yes	1,841	54	1,043	25
No	2,573	47	1,746	29
Education				
High school graduation or less	1,439	45	778	23
Some postsecondary	1,086	50	734	26
Postsecondary graduation	1,880	53	1,272	32
Household income				
Lowest/lower-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

Source: National Population Health Survey
 Note: Totals may not add because amounts too small to provide reliable estimates were excluded.
 * 41 or more hours per week.

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.

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 occupations or in blue-collar occupations (Table 2). High proportions of shift workers and the self-employed worked long hours. And not surprisingly, long hours were very common among those 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 persons who reported these situations, no significant differences existed 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 more 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 2: Persons aged 25 to 54 who worked 35 hours or more per week throughout 1994-95, by job characteristics

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

Source: National Population Health Survey
* 41 or more hours per week.

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 (National Health and Welfare, 1988; Gilmore, 1999). The 25-to-27 range is suggested as a caution zone that may lead to health problems in some people.

Table 3: Working hour patterns, persons aged 25 to 54 who worked 35 hours or more per week throughout 1994-95

	Men	Women
	%	
Standard hours in 1994-95		
Continued standard hours in 1996-97	64	69
Moved to long hours in 1996-97	21	8
Reduced hours in 1996-97	15	23
Long hours in 1994-95		
Continued long hours in 1996-97	66	48
Reduced hours in 1996-97	34	52

Source: National Population Health Survey
Note: Long hours are 41 or more per week.

Among the 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 of women: 25%, compared with 13%. The men with excess weight (BMI 25 or higher) averaged 196 pounds (89 kilograms); the women, 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 was minimal: about one 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; of these, the men gained an average of 19 pounds (8.6 kilograms), and the women, 21 pounds (9.7 kilograms).

For men, moving from standard to long hours was associated with unhealthy weight gain. 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 (data not shown). Among women, no significant association was found between unhealthy weight gain and a change in work-

ing 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, some 28% of the male and 25% of the female workers in this analysis were daily smokers (Table 4). No relationship existed, however, between working hours and the propensity to be a daily smoker. As well, unlike other studies that have found an association between job strain and smoking (Hellerstedt and Jeffery, 1997; Green and Johnson, 1990), this analysis found no significant relationship for either sex.

Table 4: Health indicators, persons aged 25 to 54 who worked 35 or more hours per week throughout 1994-95

	Men	Women
	%	
New major depressive episode, 1996-97	3	5
Body mass index, 1994-95		
Some excess weight (BMI 25 to 27)	25	13
Overweight (BMI greater than 27)	36	23
pounds (kilograms)		
Average weight in 1994-95		
Total	180.7 (82.0)	141.7 (64.3)
BMI 25 or higher	195.7 (88.8)	167.6 (76.0)
Average weight gain by 1996-97		
% gain	1.2 (0.5)	2.0 (0.9)
	0.9	1.6
Unhealthy gain		
% with gain	19.1 (8.6)	21.4 (9.7)
	10	10
Daily smoker, 1994-95 (%)		
	28	25
Increase in daily smoking by 1996-97 (%)		
Average daily increase (cigarettes)	9	7
	10	8
Increase in weekly alcohol consumption by 1996-97 (%)		
Average weekly increase (drinks)	34	25
	6	3
Decrease in leisure-time physical activity by 1996-97 (%)		
Average decrease (periods per month)	43	41
	16	14

Source: National Population Health Survey
Note: Based on male and female longitudinal respondents for whom non-proxy information was available. Excludes "missing."

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

For both sexes, changing from standard to long hours was associated with increased smoking. But as is true for weight gain, factors such as age and education can affect smoking behaviour. Therefore, 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 than men who continued to work standard hours; the corresponding odds for women were more than four times higher (data not shown).

Alcohol consumption

Between 1994-95 and 1996-97, some 34% of male workers and 25% of female workers studied increased their weekly alcohol consumption (Table 4). Men who increased their consumption took, 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. Those who moved from standard to long hours had higher odds of increased consumption, compared with those who continued to work standard hours (data not shown). 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. This may reflect health problems that could have prompted the reduction in work hours. Male shift workers, too, had significantly low odds of reporting increased drinking.

Data source and limitations

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 (Swain, Catlin and Beaudet, 1999). 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.

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

Respondents were asked their usual weekly working hours and the start and end dates for each job over the previous year. It may have been difficult for some 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. The calculation to derive average working hours was based on a maximum of three 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.

Respondents classified as working standard hours in 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; 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.

Physical activity

In 1994-95, male workers included in this analysis exercised, on average, 19 times per month, while female workers exercised 17 times per month. For both sexes, work hours made no significant difference to the average number of times they exercised.

Measures of work characteristics

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

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 people 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 jobholders*.

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 main job.

Respondents 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 persons who worked 35 or more hours per week throughout reference year 1994-95.

The study examined the following categories of average *working hours* across reference years:

- standard-standard: standard hours the entire year in both reference years
- standard-long: standard hours for the entire reference year 1994-95 and long hours for the entire reference year 1996-97
- standard-reduced: standard hours for the entire 1994-95 reference year, and reduced hours (less than 35 per week) or weeks (less than 52) in reference year 1996-97
- long-long: long hours for the entire year in both reference years
- long-reduced: long hours for the entire 1994-95 reference year, and reduced hours (less than 41 per week) or weeks (less than 52) in 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*, people 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 1, 2, 3, 4 and 7).

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.

Between 1994-95 and 1996-97, some 43% of men and 41% of women reduced the number of times they exercised. However, those who decreased their physical activity tended to have had relatively high levels to begin with: the men had exercised an average 29 times per month in 1994-95, and the women, 27 times. By 1996-97, these men and women had reduced their exercise level to an average 13 times per month.

However, changes in working hours were not related to a decrease in physical activity. The odds that workers who moved from standard to long hours would report fewer periods of exercise were not sig-

nificantly different from the odds for workers who continued with standard hours (data not shown). 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 apt to reduce the time available for exercise. Furthermore, they run counter to the observations in the previously mentioned British study (Sease and Scales, 1998). 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.

A finer breakdown of working hours in the NPHS data—standard (35 to 40 hours per week), somewhat long (41 to 59 hours), and excessively long (60 or more hours)—revealed modest decreases in exercise levels among women who moved from standard to somewhat long hours, and among men who moved from somewhat long to excessively long hours. All other cases showed modest increases in exercise levels. When the analysis was repeated eliminating those who did not exercise at all in 1994-95, the patterns were similar.

Some respondents may have used exercise to cope with potential stressors associated with long working hours. However, seasonality may also play a role. 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.

Depression

Previous studies have shown a number of mental health problems to be related to the work environment (Karasek, 1979; Lerner et al.,

1994). 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, some 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). Women who worked long hours in 1994-95 had 2.2 times the odds of noting a major depressive episode, compared with those who worked standard hours (data not shown). For men, no relationship was found between depression and long working hours. However, consistent with previous studies, high job strain was related to depression for both sexes.

Conclusion

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 work week (Hameed, 1974). This has not happened. In fact, the proportions of men and women putting in long hours have been rising since the early 1980s.

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 jobholding. For men, long hours were also associated with being aged 25 to 44, and with 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 put in 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.

Perspectives

Readers who wish to see tables presenting the odds ratios mentioned in this article should consult the full study: “Long working hours and health,” *Health Reports* (Statistics Canada, Catalogue no. 82-003-XPB) 11, no. 2 (Autumn 1999): 33-48.

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