Obesity on the job

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Obesity in the workplace is a growing phenomenon, with repercussions for both workers and their employers. International studies have found that the combination of a sedentary job and poor eating habits often leads to obesity, which can put the heart at risk and pave the way for a litany of other diseases. Obesity is a risk factor for type 2 diabetes, cardiovascular disease, gall bladder disease, and some cancers (Brunner et al. 2007). As well, obese workers have a substantially higher prevalence of metabolic, circulatory, musculoskeletal, and respiratory disorders (Thomson Healthcare 2007).

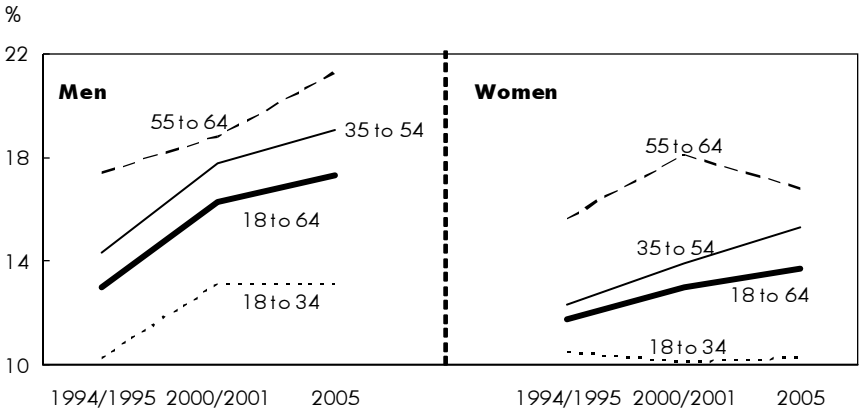
Obesity in the workplace can have economic costs as well: obese employees in Australia had more frequent and lengthier work absences (Australian Institute of Health and Welfare 2005), and in the United States obesity was associated with 39 million lost work days, 239 million restricted-activity days, 90 million bed days and 63 million physician visits in 1994 (Wolf and Colditz 1998).

Although numerous studies have looked at obesity as a health issue, less is known about obesity among Canadian workers and its economic implications. Using the Canadian Community Health Survey (CCHS) and the National Population Health Survey (NPHS), this study investigates trends in obesity among the employed and looks at the sociodemographic and labour force correlates of obesity.[1] Multivariate models help investigate the persistent effects of some factors by controlling for health conditions and behaviours. Also examined is the prevalence of work stress indicators to shed light on the relationship between obesity and workplace stress (see *Data sources and definitions*). Finally, this article analyzes the associations between obesity and job performance measures such as work activity limitations, disability days, work injuries and absences.

Obesity on steady rise among workers

In 2005, more than two million employed Canadians age 18 to 64 were obese. Based on self-assessed weight and height, the obesity rate among workers has steadily increased, especially for men (Chart A).[2] Obesity was most prevalent

Chart A Obesity rates have increased faster for male workers



Sources: Statistics Canada, National Population Health Survey, 1994/1995; Canadian Community Health Survey, cycle 1.1, 2000/2001; Canadian Community Health Survey, cycle 3.1, 2005.

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Data sources and definitions

The **National Population Health Survey** (NPHS), which began in 1994/1995, collects information about the health of the Canadian population every two years. It covers household residents in all provinces and territories, except on Indian reserves, on Canadian Forces bases, and in some remote areas. This analysis is based on the survey's cross-sectional component for household residents. The 1994/1995 non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate.

The **Canadian Community Health Survey** (CCHS), which began in 2000/2001, collects population-level information on health determinants, health status and health system utilization. The CCHS comprises a general health survey in the first year of the cycle that samples approximately 130,000 Canadians and provides information at the level of provincial health regions, and a focused topic survey in the second year that samples approximately 35,000 and provides provincial information.

A description of the CCHS methodology is available in a published report (Béland 2002). In this analysis, data from cycle 1.1 (2000/2001) and cycle 3.1 (2005) were used to calculate obesity rates of male and female workers for examining historical trends. Cycle 2.2 (2004), which focused on nutrition, was used to obtain body mass index (BMI) information based on measured height and weight. In CCHS 2.2, height and weight measurements were conducted for 62% of survey respondents age 12 years or older. With a special sample weight applied, the estimates for this group represented the Canadian population. These data were used to determine obesity and being overweight for workers age 18 to 64. Cycle 1.2 (2002, Mental Health and Well-being) was used to examine the association between work stress and occupational factors and obesity among workers. Cycle 3.1 was used to analyze sociodemographic correlates of obesity and the effects of obesity on job performance.

To account for the survey design effects of the CCHS, coefficients of variation and p-values were estimated and significance tests were performed using the bootstrap technique. The significance level was set at $p \leq 0.05$.

To measure work stress, the CCHS employed an abbreviated version of Karasek's Job Content Questionnaire (JCQ). The CCHS measured work stress of respondents who worked at a job or business in the past 12 months. Twelve items in the JCQ (for detailed measurements, see Park 2007) were used to measure job control, psychological demands, job insecurity, physical exertion and social support at the workplace. The job strain ratio was calculated by dividing the adjusted score for psychological demands by that of job control. A small constant (0.1) was added to both the numerator and denominator to avoid division by 0. To deal with outliers, scores greater than 3 were set to 3. Respondents were classified as being in **high job strain** if the ratio was 1.2 or higher.

Respondents who strongly disagreed, or disagreed with the statement "your job security is good" were classified as having **job insecurity**. Respondents who strongly agreed or agreed with the statement, "your job requires a lot of physical effort" were classified as having **high physical exertion**. Respondents were classified as having **low social support at the workplace** if they either agreed or strongly agreed with being exposed to hostility or conflict from co-workers or disagreed or strongly disagreed with supervisors or co-workers being helpful in getting the job done.

In addition, respondents were asked about satisfaction with their job. Those answering not too satisfied or not at all satisfied were classified as having **job dissatisfaction**.

Self-perceived work stress at the main job or business in the past 12 months was measured by asking "Would you say that most days at work were: not at all stressful? not very stressful? a bit stressful? quite a bit stressful? extremely stressful?" Respondents who answered quite a bit or extremely were classified as having **high self-perceived work stress**.

Occupations were collapsed into **white-collar** (management; professional; technologist, technician or technical occupation; and administrative, financial or clerical), **sales and service**, and **blue-collar** (trades, transport or equipment operator; farming, forestry, fishing or mining; and processing, manufacturing or utilities).

Shift work refers to anything other than a regular daytime schedule (i.e. evening, night, rotating, or split shifts).

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

among older workers (age 55 to 64)—17% in 1994/1995, 19% in 2000/2001, and 21% in 2005.[3] The pattern held for both men and women, although the prevalence was lower among women.[4] Overall, the prevalence of obesity among employed women increased from 12% to 14%. Although only a small portion of workers were severely obese (obesity class II or III; body mass index (BMI) of 35 or more)—with a high health risk and needing more aggressive approaches to weight loss—a similar increasing trend was observed (from 2.8% in 1994/1995 to 4.1% in 2005). The increasing trend of obesity among workers may be attributable to an environment that, in multiple ways, encourages excessive eating and discourages physical activity (Raine 2004) and to increases in more sedentary jobs (Finkelstein et al. 2005).

When height and weight were measured, even higher rates of obesity and being overweight[5] were observed.[6] For example, based on self-reporting, 59% of employed men were obese or overweight in 2005,

compared with 63% based on actual measurement in 2004 (Chart B).[7,8] Also, more than three-quarters of men age 55 to 64 were either overweight or obese according to physical measurement—8 percentage points more than the self-reported figure. Discrepancies were more pronounced among women. Based on measured height and weight, half of employed women were obese or overweight. The under-reporting of body weight may indicate the stigma associated with obesity and being overweight. This may also explain the greater tendency to under-report weight among women, who may feel more pressure to conform to 'desirable' standards (Shields et al. 2008b).

Sociodemographic correlates of obesity

Multivariate logistic regression models were used to investigate whether any specific groups of workers are at a greater risk of being obese. Associations between obesity and personal and labour market characteristics were examined while controlling for possible confounders such as sex, age, student status and self-perceived health. Since these multivariate analyses were based on cross-sectional data, neither causality nor temporal ordering can be inferred.

An interesting difference between men and women was found in the relationship between obesity and personal income. Men age 35 to 54 in the bottom half of the personal income distribution were less likely to be obese than their contemporaries in the top quarter (Table 1). However, women age 18 to 54 with low personal income were more likely than high-income earners to be obese. This may be related to differing symbolic values of body size and shape for men and women (McLaren 2007). According to a recent study using measured BMI, a greater frequency of dining out among higher-income groups may also be associated with the inverse relationship between income and being overweight among men (Kuhle and Veugelers 2008).

Chart B Obesity and overweight rates are higher with measured versus self-reported data, especially for women

Sources: Statistics Canada, Canadian Community Health Survey, 2004, cycle 2.2 for measured body mass index; Canadian Community Health Survey, 2005, cycle 3.1 for self-reported body mass index.

Table 1 Adjusted[1] odds ratios of correlates of obesity among the employed

	18 to 64		18 to 34		35 to 54		55 to 64	
	Men	Women	Men	Women	Men	Women	Men	Women
	adjusted odds ratio							
Age								
18 to 34 (ref.)	1.00	1.00	...	...	...	...	...	...
35 to 54	1.22*	1.42*	...	...	...	...	...	...
55 to 64	1.23*	1.42*	...	...	...	...	...	...
Personal income								
Bottom quarter	0.78*	1.45*	1.00	2.69*	0.71*	1.42*	0.66*	1.15
Second quarter	0.91	1.37*	1.10	2.60*	0.84*	1.33*	0.91	0.97
Third quarter	1.07	1.29*	1.24*	2.03*	0.99	1.28*	1.12	1.03
Top quarter (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Education								
Less than high school	1.38*	1.35*	0.98	1.02	1.60*	1.56*	1.42*	1.31
High school graduate	1.15*	1.05	1.07	1.03	1.18*	1.04	1.22	1.30
Some postsecondary	1.22*	1.34*	1.01	1.19	1.33*	1.59*	1.45	1.13
Postsecondary graduate (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Marital status								
Married (ref.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Never married	0.74*	1.11	0.58*	0.82*	0.99	1.48*	0.91	1.56*
Previously married	0.82*	1.29*	0.66	1.15	0.85	1.33*	0.87	1.31*

* significantly different from the reference group (ref.) at the 0.05 level
1. Adjusted for student status, self-perceived health, chronic condition.
Source: Statistics Canada, Canadian Community Health Survey, 2005, cycle 3.1.

However, low education significantly increased the odds of obesity for both men and women, except for young workers (age 18 to 34). For example, the odds were 1.6 times as high for workers age 35 to 54 with less than high school graduation as they were for workers with completed postsecondary education. This is consistent with previous research suggesting correlations between education level and healthy lifestyles (including eating habits and physical activity levels), which, in turn, determine body weight (Raine 2004).

Compared with married workers, never-married workers age 18 to 34 were less likely to be obese. It may be inferred that never-married workers tend to put more value on their body image when they are young. However, older never-married women had higher odds of being obese. As well, previously married female employees age 35 to 64 were more likely to be obese than their currently married colleagues.

Labour force characteristics

Significant differences in age-adjusted prevalence rates of obesity were found in some occupation-related categories for men. Compared with men in white-collar jobs, a higher proportion of blue-collar workers were obese in 2002 (Table 2).[9] Similarly, compared with other workers, higher obesity rates were found among men whose usual daily activities or work habits for the past three months were doing heavy work or carrying very heavy loads. Men working longer hours (more than 40 per week) were also more likely to be obese than regular full-time workers (30 to 40 hours per week). Being self-employed or an employee did not make any significant difference in obesity. Compared with regular-schedule workers, however, a greater proportion of shift workers (both men and women) were obese.

Although a definite causation between labour force characteristics and obesity cannot be determined, work stress caused by irregular arrangements (for example,

Table 2 Age-adjusted prevalence of obesity among the employed, age 18 to 64

	Men	Women
	%	
Occupation		
White-collar (ref.)	16.0	15.1
Sales and service	18.8	16.8
Blue-collar	19.2*	16.1
Weekly work hours		
Less than 30	18.1	16.0
30 to 40 (ref.)	16.0	15.7
Over 40	19.2*	16.0
Self employment		
Yes (ref.)	19.0	16.7
No	17.1	15.6
Shift work		
Yes (ref.)	19.8	18.5
No	16.8*	14.9*

* significantly different from the reference group (ref.) at the 0.05 level
Source: Statistics Canada, Canadian Community Health Survey, 2002, cycle 1.2.

excessive hours or shift work) may be related to obesity—it was associated with other conditions of well-being like work-life imbalance (Williams 2008). Non-standard work schedules may also make it more difficult for workers to engage in healthy eating patterns.

Work stress

Stress may contribute to obesity via its effects on behaviour and metabolism (Brunner et al. 2007). In 2002, a significantly higher proportion of obese workers reported having high job strain (Table 3). High job strain comes from having high psychological demands (how mentally challenging a job is) and low job control. This suggests that obesity may be a result of the biological and behavioural effects of stress. Previous research has found that the development of obesity may be directly related to biological effects of chronic stress, tending to cause the deposition of intra-abdominal fat (Schulte et al. 2007). Obesity can also be caused by unhealthy coping mechanisms such as overeating, physical inactivity and excessive alcohol consumption (Park 2007). However, a temporal ordering cannot be determined from cross-sectional data—higher job strain may precede obesity, but being obese at work may also increase work stress.

Measuring obesity

Body mass index (BMI) was used in calculating obesity. BMI is equal to a person's weight in kilograms divided by the square of their height in metres. A BMI cutoff of 30 kg/m^2 was used to classify adults as obese (25 to 29 for overweight, 18.5 to 24.9 for normal weight) in accordance with the health risks associated with classification in this BMI category (Health Canada 2003). BMIs for workers age 18 to 64, excluding pregnant women, were calculated to determine their obesity. Particular caution should be used when classifying naturally very lean adults, very muscular adults, some ethnic and racial groups, and seniors. Unless otherwise stated, obese workers were compared with normal-weight workers.

Furthermore, in 2002, a higher proportion of obese men and women felt that they received low social support from colleagues and supervisors at work. In other words, obese workers perceived not only high levels of job strain, but also an insufficiency of an important buffer against work stress. High psychological workload, together with a lack of proper social support at work, may act as a causal factor for obesity.

In addition, obese men were more likely to indicate that their work required a lot of physical effort compared with their normal-weight colleagues. This may be related to the high prevalence of obesity among men in blue-collar occupations.

Table 3 Age-adjusted prevalence of work stress indicators, employed persons age 18 to 64

	Men		Women	
	Obese	Normal weight	Obese	Normal weight
		%		
Job insecurity	17.4	14.8	15.3	14.9
Job dissatisfaction	9.5	9.2	9.9	9.8
High physical exertion	50.9*	46.7	41.3	38.4
Low co-worker support	44.0*	39.9	43.9*	38.1
High job strain	22.6*	18.9	31.9*	27.1
High self-perceived work stress	30.6	28.7	34.1	34.2

* significantly different from normal weight workers at the 0.05 level
Source: Statistics Canada, Canadian Community Health Survey, 2002, cycle 1.2.

Job performance

Obesity and job performance are clearly correlated in the data. The CCHS asked: "Last week, did you have a job or business from which you were absent?" For this study, those absent from work and indicating their own illness or injury as the primary reason for absence were considered absent due to a health problem. The odds of being absent from work were almost four times higher for obese young men (18 to 34) than for those with normal weight, after controlling for socio-economic and health-related confounding factors (Table 4). Among older men and women, however, the effect of obesity on illness absence was not found. This may be because many older obese people are already out of the labour market and only those who are healthier tend to continue working.

Research has shown that obesity, especially for women, may have a negative impact on workers more often through presenteeism (that is, reduced productivity on the job) rather than absenteeism (Gates et al. 2008). Indeed, obese women age 35 to 64 were more likely than those with normal weight to report reduced work activities due to a long-term health problem.[10] As well, compared with their normal-weight colleagues, obese men age 55 to 64 had a higher risk of reducing their work activity due to a long-term health problem.

Similar to the findings on reduced work activity, women's obesity was related to their probability of taking a disability day. This refers to any days in the past two weeks where the person stayed in bed all or most of the day (including nights in hospital), cut down on normal activities, or required extra effort in daily activities because of illness or injury. Obese women age 35 to 64 were significantly more likely than their normal-weight colleagues to take a disability day.

Obesity is clearly associated with a person's inability to work due to poor health.[11] However, the analysis shows that obesity has a persistent effect on job performance after controlling for self-perceived health.[12] Non-health factors may further prevent obese workers from being productive.

Finally, excess weight can reduce work activity due to the increased chances of injury on the job.[13] Obese women age 35 to 54 were significantly more likely to have reported a work injury during the past year than those with body weight in a normal range.[14] This is consistent with previous research that found obese women to be significantly more likely to be injured at work than those in the normal weight range (Wilkins and Mackenzie 2007). The association between injury and obesity is related to fatigue, sleepiness, physical limitations and ergonomics (Pollack et al. 2007). Obese workers' use of medications due to their chronic conditions can also increase the risk of injury. In addition, it is possible that personal protective equipment, such as gloves and eye goggles, is less likely to be used by obese workers due to lack of comfort, fit or availability.

Conclusion

The prevalence of obesity in the Canadian workforce has increased over the last decade, from 12.5% in the mid-1990s to 15.7% in 2005. Overall, men and older workers are more prone to obesity. Low education is

Table 4 Adjusted[1] odds ratios of obesity on job performance for workers age 18 to 64

	18 to 64		18 to 34		35 to 54		55 to 64	
	Men	Women	Men	Women	Men	Women	Men	Women
	adjusted odds ratio							
Absence due to illness, past week	2.74*	0.84	3.70*	0.79	2.86	0.72	1.78	1.53
Reduced activity, long-term health problem	1.26*	1.53*	1.18	1.19	1.19	1.57*	2.09*	1.81*
Disability day, past two weeks	1.15*	1.37*	1.10	1.21*	1.19	1.46*	1.26	1.52*
Work injury, past year	1.11	1.73*	0.90	1.25	1.18	2.12*	1.86	1.83

* significantly different from normal weight workers at the 0.05 level
1. Adjusted for income, education, marital status, student status, work arrangement and self-perceived health.
Sources: Statistics Canada, Canadian Community Health Survey, 2005, cycle 3.1; Canadian Community Health Survey, 2002, cycle 1.2.

associated with obesity for both employed men and women, and low income for women. However, income had the opposite effect on men, with high personal income linked to obesity. For young workers, marriage was positively associated with obesity, but it seemed to have a protective effect for older workers. Work arrangements such as shift work and excessive working hours were associated with obesity.

The effects of obesity appeared to be quite age and sex specific. Obesity affected work absenteeism for young men, but work presenteeism for older women. Workers' obesity was also related to elevated levels of work stress as these workers had higher job strain and lower co-worker support.

Findings of this analysis reveal costs of obesity in multiple dimensions. Obesity can cause personal stress and long-term health problems. Moreover, it can lead to significant societal costs by reducing labour market productivity. More specifically, the implication is that reducing or preventing obesity in the workplace would have multiple potential benefits, including better health and well-being, and higher productivity and better job performance. It may be cost-effective for employers to actively sponsor health promotion initiatives in the workplace, including weight maintenance programs. Similarly, public health interventions to prevent weight gain may have societal benefits beyond improvements in workers' personal health.

Notes

1. This analysis provides information for specific sex and age groups, not only because the prevalence of obesity is strongly related to age and sex (Clarke et al. 2008; Wellness.com 2009) but also because obesity may have different social significance for specific population groups. For instance, a high BMI tends to be more acceptable among men and older individuals.
2. Unless otherwise stated, workers are defined as those who worked at or were absent from a job or business in the week prior to the survey.
3. This increasing trend may be underestimated as the 2005 CCHS was done mostly via telephone interviews, while large proportions of the 1994/1995 NPHS and the 2000/2001 CCHS were based on in-person interviews. A tendency to under-report body weight was more prevalent in telephone surveys than in face-to-face interviews.
4. Obesity may be associated with lower rates of labour force participation among those age 50 to 69. Among those not working for health reasons, a higher proportion were obese compared with people in the same age group who were working (Pyper 2006).
5. Overweight people tend to become obese over time. Almost one-quarter of those who were previously overweight had become obese in eight years (Le Petit and Berthelot 2005).
6. On average, men over-reported their height by 1 cm; women, by 0.5 cm. Women under-reported their weight by an average of 2.5 kg; men, by 1.8 kg. As a result, when based on measured rather than self-reported height and weight, the prevalence of obesity increased (Shields et al. 2008b).
7. Due to limited sources of physical measurement of height and weight, it was not possible to analyze the recent trends in obesity based on measured BMI.
8. Compared with U.S. workers, a lower proportion of Canadian workers, especially women, were obese. Based on equivalent physical measurement data, 29% of American workers (26% of men and 33% of women) were obese in 1999/2000 (Hertz and McDonald 2004), while the rate for Canadian workers was 22% in 2004 (22% for men and 21% for women).
9. This occupational difference may be due to education levels. If education is controlled for, occupational differences in the prevalence of obesity disappear.
10. Reduced work activities in the CCHS were based on a response of often or sometimes (versus never) to: "Does a long-term physical or mental condition or health problem reduce the amount or kind of activities you can do at work?"
11. As this analysis is based on self-reported data, associations between obesity and obesity-related health conditions may be exaggerated (Shields et al. 2008a). This is because respondents with substantially higher BMIs tended to be classified as obese by self-reported height and weight.
12. Even after controlling for health status and health behaviours such as smoking, drinking, and physical inactivity, statistical associations between obesity and job performance found in the current models stayed significant.
13. In the CCHS, respondents were instructed to report injuries that were serious enough to limit their normal activities. In this analysis, work injury was defined as a serious injury that took place while respondents were working at a job or business.

14. To minimize bias due to the healthy-worker effect, the sample for the work injury analysis comprised data from respondents who had been employed at some time during the year leading up to their survey interview, even if they were not employed at the time of their interview. These respondents were included so that those who had been injured and then ceased working—perhaps because of their injury—would be not be excluded (Wilkins and Mackenzie 2007).

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