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Health Reports

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Early sexual intercourse

Page 12
In table 1, the first figure in the column "%" under "Boys" should be 13.5.


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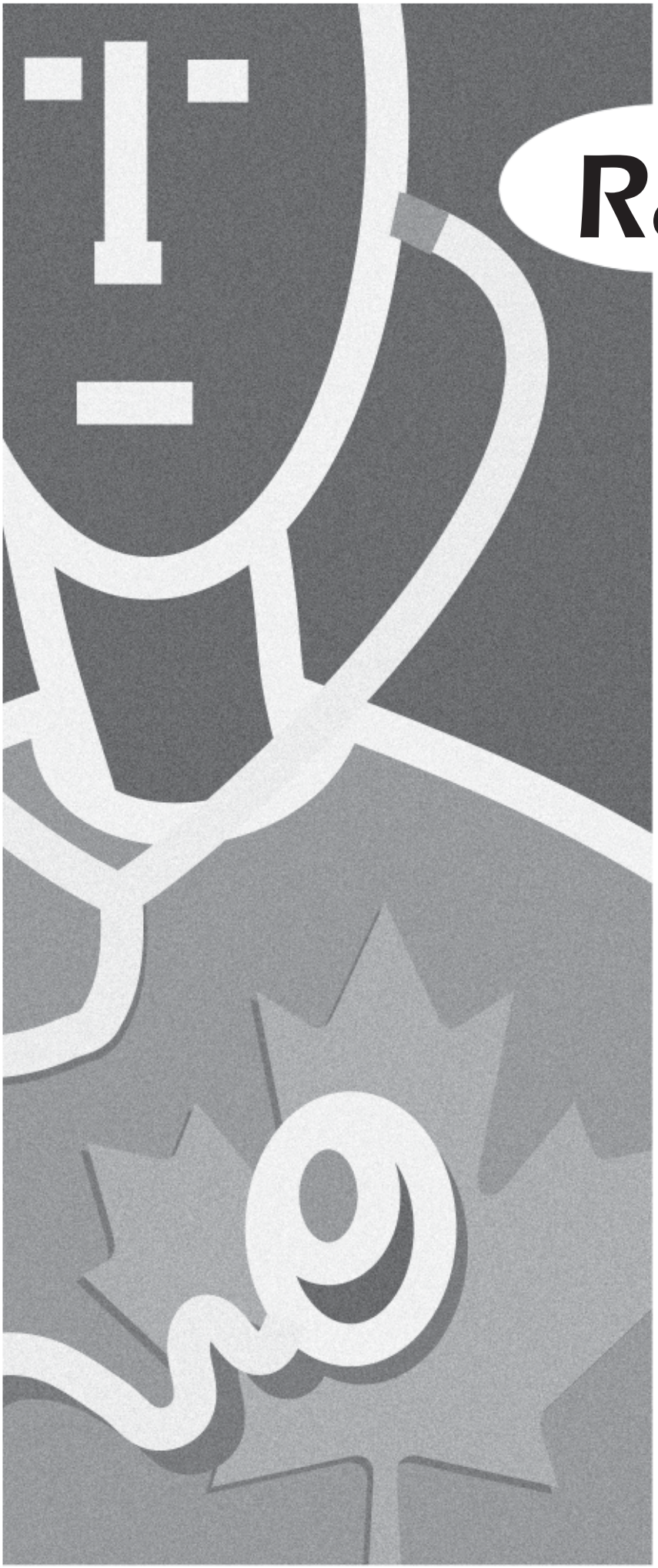

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Weekly work hours and health-related behaviours in full-time students

Gisèle Carrière

Abstract

Objectives

This article examines associations between the number of hours of paid work and smoking, alcohol use, episodic heavy drinking and leisure-time physical activity among full-time students aged 15 to 17.

Data sources

Analyses are based on data from the 2003 Canadian Community Health Survey and the 1994/95 to 2002/03 National Population Health Survey.

Analytical techniques

Selected characteristics and health-related behaviours of working and non-working students were compared. Logistic regression was used to examine relationships between average weekly hours at the main job and health-related behaviours, as well as maintenance of and changes in these behaviours, while controlling for possible confounders.

Main results

Students who worked even a modest number of hours per week had higher odds of drinking alcohol regularly, and occasionally heavily, compared with those who had not worked. Students working any number of hours had higher odds of becoming regular drinkers within two years of their baseline interview. Longer working hours were associated with higher odds of smoking. Employed students had higher odds of being physically active in their leisure time. The influences of age, household income and urban/rural residence were taken into account.

Key words

adolescent, alcohol drinking, employment, health surveys, longitudinal studies, physical activity, smoking

Author

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Many high school students work during summer months, and some also choose to add a paying job to their schedules throughout the academic year. Increasingly, paid employment may be critical to financing postsecondary education.[1,2] While the pay received is likely attractive to teens for many reasons, working during adolescence can offer other benefits. Having work experience, for example, may ease a young person's transition into the labour market upon graduation. Working teens may take on increased responsibility, and may enjoy a greater sense of independence and higher self-esteem.[3] They are also more likely to be involved in positive activities in their communities.[4]

Despite such advantages, there is evidence suggesting that negative associations emerge when adolescents combine school and work. A recent study found a negative association between longer hours of work and health determinants such as leisure-time physical activity.[5] Research has also consistently established higher rates of substance use, including cigarettes and alcohol, among adolescent students who work, compared with those who do not.[6-8]

Although some studies have focused on the relationship between the number of hours worked and specific health-related behaviours, many unknowns remain about the nature of these associations. The likelihood of substance abuse (including alcohol use) in adolescents has been shown to be substantially higher beyond a threshold of 15 to 20 hours per week.[9] In other research, a more steadily increasing relationship between the likelihood of substance abuse and the number of work hours emerged.[7] Working more than 20 hours per week has also been associated with lower levels of school attachment, greater autonomy from parents, and more alcohol use.[9] The mechanisms behind these associations, however, are not fully understood.

This article examines several health-related behaviours of full-time students aged 15 to 17—smoking, regular drinking, heavy episodic drinking, and leisure-time physical activity—in relation to hours worked weekly at a paying job (see *Working students* and *Definitions*). In addition to adjusting for

Data sources

This article is based on data from the 2003 Canadian Community Health Survey (CCHS, cycle 2.1) and the 1994/95 to 2002/03 National Population Health Survey (NPHS, cycles 1 through 5). Both are general health surveys that cover a broad range of topics.

The CCHS covers the household population aged 12 or older in all provinces and territories, except residents of Indian reserves, Canadian Forces bases, and some remote areas. Cycle 2.1 began in January 2003 and ended in December that year. The response rate was 80.6%, yielding a sample of 135,573 respondents. More detail about the sample design of the CCHS is available in another report.[10]

The cross-sectional analysis began with an initial subset of 5,485 CCHS respondents aged 15 to 17 who were full-time students and had worked for pay in the 12 months before their survey interview. Those whose records did not provide enough information to determine the average number of hours worked weekly at their main job (154) were excluded, resulting in a sample of 5,331 (2,697 boys and 2,634 girls).

The National Population Health Survey (NPHS), conducted every two years, covers household and institutional residents in all provinces and territories, except residents of Indian reserves, Canadian Forces bases, and some remote areas. The NPHS has both longitudinal and cross-sectional components; beginning in 2000/01 (cycle 4), the NPHS became strictly longitudinal.

The 1994/95 NPHS (cycle 1) data were collected using two questionnaires: General and Health. With the General questionnaire, socio-demographic and some basic health information was collected from one knowledgeable household member for all members of sampled households. With the Health questionnaire, additional in-depth health information about one randomly selected household member was collected.

In 1994/95, the NPHS collected information from 20,725 households, meaning that at least the General questionnaire was completed for the randomly selected respondents. This yielded a response rate of 88.7%. The response rate to the Health questionnaire for the randomly selected respondents was 96.1%, or 17,276 respondents, who then formed the basis for the longitudinal panel. The response rates for the longitudinal panel in subsequent cycles were 92.8% in 1996/97, 88.2% in 1998/99, 84.8 % in 2000/01, and 80.6 % in 2002/03. More detailed descriptions of the NPHS design, sample and interview procedures are available in other reports.[11,12]

For this analysis, the 2002/03 NPHS (cycle 5) longitudinal square file was used to generate a file of respondents compiled across four cycles. This preliminary file included all respondents who had reached the ages of 15, 16 or 17 in cycle 1, 2, 3 or 4 and who had also completed two consecutive survey cycles. The same education and employment criteria that had been applied to the CCHS sample were applied to this NPHS file. The resultant analytical file initially included four mutually exclusive groups: 467 respondents aged 15 to 17 from cycle 1; 445 respondents who had reached the ages of 15 to 17 by cycle 2 and who had not been included in the first group; 404 respondents who had reached the ages of 15 to 17 by cycle 3; and 423 respondents aged 15 to 17 by cycle 4 who were not part of the first, second or third group. In total, this amounted to 1,739 full-time students who indicated whether they had worked for pay in the past 12 months. Of these, 141 were excluded because there was not enough information to determine the average number of hours worked weekly. The final analytical file comprised 1,598 full-time students aged 15 to 17.

socio-economic factors such as household income, the analysis controlled for urban/rural residence; recent research has suggested that tobacco and alcohol use of urban and rural youth differ.[13] The estimates are based on data from the 2003 Canadian Community Health Survey (CCHS) (see *Data sources, Analytical techniques* and *Limitations*). Longitudinal data from the National Population Health Survey (NPHS) were used to follow students over time to assess if the average number of weekly hours worked was related to subsequent changes in health-related behaviours.

Most students worked

In 2003, an estimated 63% of full-time high-school students aged 15 to 17 had worked for pay in part- or full-time jobs in the past 12 months (Table 1). The older teens in this group were more likely to work, as were those from households with higher incomes or in rural areas.

A third of these students (30%) averaged 5 or fewer hours at their main job in a typical week. But some (5%, an estimated 52,000) said that they had worked more than 20 hours on average; this was more likely among boys than girls.

Working regularly scheduled hours was common, especially for boys (Table 2). This means they worked regular daytime, evening or night shifts. Irregular hours, including on-call schedules, were more common for girls. Not surprisingly, about three-quarters of these full-time students with jobs worked weekends. Some may have usually worked both weekends and weekdays, or weekdays only, but it was not possible to differentiate between these schedules, as the information is from a question designed specifically to determine weekend work.

Table 1
Percentage distribution of average weekly hours at main job in previous 12 months, by selected characteristics, full-time students aged 15 to 17, household population, Canada, 2003

	Average weekly hours					
	0 (not employed)	≤5	>5 to ≤10	>10 to ≤15	>15 to ≤20	>20
	%					
Total	37	30	14	8	6	5
Sex						
Girls†	37	30	14	8	6	4E
Boys	37	30	13	8	6	6*
Age						
15†	53	32	7	4	2E	1E
16	33*	30	18*	8*	6*	5*
17	20*	27*	18*	13*	11*	10*
Household income						
Lowest/Lower-middle†	47	29	9E	x	F	F
Middle	35*	30	17*	6E	6E	6E
Upper-middle/Highest	34*	31	15*	9*	6	5
Missing	40	30	13	8*	5	5E
Residence						
Rural†	28	33	17	8	8	6
Urban	39*	30	13*	8	5*	5

Data source: 2003 Canadian Community Health Survey
Note: Because of rounding, detail may not add to 100%.
† Reference group
** Significantly different from estimate for reference group (p < 0.05)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)
F Coefficient of variation greater than 33.3% (suppressed because of extreme sampling variability)
x Suppressed to meet confidentiality requirements of Statistics Act

Table 2
Percentage distribution of selected characteristics, by typical schedule of main job, and percentage working weekends, employed full-time students aged 15 to 17, household population, Canada, 2003

	Typical schedule		
	Regular†	Irregular‡	Weekends
	%		%
Total	69	31	76
Sex			
Girls§	66	34	78
Boys	71*	29*	73*
Age			
15§	68	32	69
16	69	31	76*
17	70	30	81*
Household income			
Lowest/Lower-middle§	72	28	77
Middle	71	29	77
Upper-middle/Highest	68	32	75
Missing	68	32	76
Residence			
Rural§	68	32	79
Urban	69	31	75*

Data source: 2003 Canadian Community Health Survey
† Regular daytime/evening/night shift
‡ On-call/Irregular shift
§ Reference group
** Significantly different from estimate for reference group (p < 0.05)*

Working students

In this analysis, *full-time student* refers to a 15-, 16- or 17-year-old who was enrolled full-time in an educational institution and had not graduated from secondary school at the time of the survey interview. In both the Canadian Community Health Survey (CCHS) and the National Population Health Survey (NPHS), full-time student status was initially derived using two questions: "Are you currently attending a school, college or university?" and "Are you enrolled as a full-time student or a part-time student?" Information from two other questions was also used to determine inclusion in this sample: "What is the highest grade of elementary or high school ever completed?" and "Did you graduate from high school (secondary education)?"

Employment status was derived from responses to questions about labour force participation: "Last week, did you work at a job or business? Please include part-time jobs, seasonal work, contract work, self-employment, babysitting and any other paid work, regardless of the number of hours worked." Respondents were also asked if they had worked at a job or business "at any time in the past 12 months." Those who had worked were asked, "During the past 52 weeks, how many weeks did you do any work at a job or business (include paid vacation leave, paid maternity leave, and paid sick leave)?" and "About how many hours a week do you usually (did you usually) work at your job/business? If you usually work (worked) extra hours, paid or unpaid, please include these hours." *Average weekly hours* worked in the past 12 months was derived by multiplying the respondent's reported number of hours usually worked weekly at their main job by the reported number of weeks worked at their main job, then dividing by 52 (see *Limitations*).

Average weekly hours worked was derived the same way for the NPHS respondents who were included in the study because they met the age criterion by cycle 4 (see *Analytical techniques*). However, for the NPHS respondents who met the age criterion in cycles 1, 2 or 3, the average number of hours was derived slightly differently because respondents were not directly asked about the number of weeks worked. Work duration in months was calculated using the start and end dates from the respondent's employment history. This "number of months worked" was multiplied by 4.33 to derive the total number of weeks worked in the past 12 months. The product of the derived total number of weeks worked and the reported typical number of hours worked per week was divided by 52 to produce the average number of hours worked weekly. Information about work hours was based on the respondents' main job if they had more than one job.

The derived average number of hours worked weekly was used to place working students into one of the following categories:

- 5 hours or less (≤ 5)
- more than 5 but not greater than 10 hours (> 5 to ≤ 10)
- more than 10 but not greater than 15 hours (> 10 to ≤ 15)
- more than 15 but not greater than 20 hours (> 15 to ≤ 20)
- more than 20 hours (> 20).

For the analysis of NPHS data, those working more than 10 hours were grouped because of the subset's small sample size (Appendix Table A). Students who reported that they had not worked for pay in the past year were categorized as having worked 0 hours (not employed).

Typical schedule was based on information for CCHS respondents who had a job: "Which of the following best describes the hours you usually work (worked) at your job or business?" Response categories were: regular daytime schedule or shift; regular evening shift; regular night shift; rotating shift; split shift; on call; irregular schedule; or "other." Regular daytime, evening and night shifts were grouped as *regularly scheduled* hours. Those with on-call, split, or rotating or irregular shifts were classified as working *irregularly scheduled* hours. Reports of "other" were excluded because it was not known if these schedules represented a typical schedule.

Students who said "yes" to "Do you (did you) usually work on weekends at this job/business?" were classified as having *typically worked weekends*. Those who answered "no," were assumed to have typically worked weekdays. These two categories are not mutually exclusive; that is, some who responded "yes," may have "usually" worked both weekend and weekday hours. These data are not specific enough to determine more precise breakdowns of schedules for the students' main job.

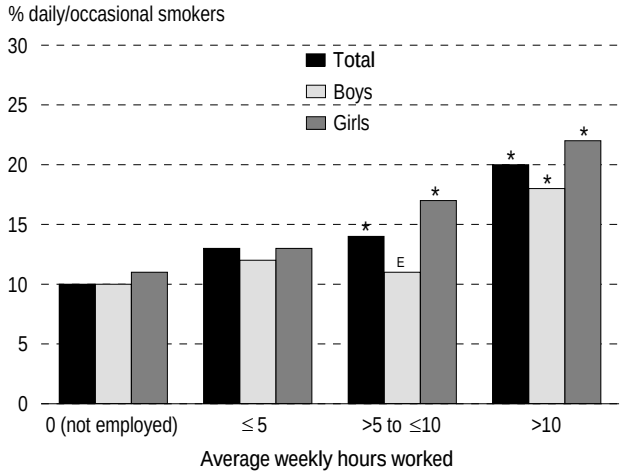
Work linked to smoking . . .

Compared with high-school students who were not employed, those who averaged more than 5 hours of work per week were more likely to report that they smoked cigarettes either daily or occasionally (Chart 1). Approximately one-fifth of the students who worked more than 10 hours a week were smokers.

Of course, the relationship between having a job and smoking can be partly explained by age, as both become more common as young people move through their teen years. But even when age, urban/

rural residence and household income were taken into account using multiple logistic regression analysis, students who worked more than 10 and up to 15 hours, or more than 20 hours weekly, had nearly twice the odds of being smokers, compared with students who were not employed (Table 3). (The odds ratio for those who worked 15 to 20 hours per week was elevated, but did not reach statistical significance (p=0.052) because of the small sample size.) These findings contrast with those of a previous study, which indicated that age moderates the relationship between longer work hours and smoking.[14] Possibly, exposure to smoking at work played a role; an estimated 40% of the employed students reported either that smoking was allowed in their workplace with some restrictions, or that their workplace had no smoking restrictions at all (data not shown).

Chart 1
Percentage of full-time students aged 15 to 17 who reported daily/occasional smoking, by average weekly hours worked in past 12 months, household population, Canada, 2003

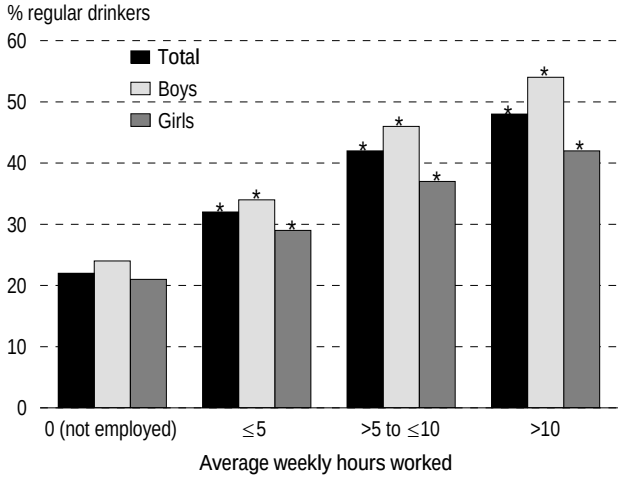


Data source: 2003 Canadian Community Health Survey
Note: Based on a sample of 5,331 full-time students aged 15 to 17 (2,697 boys and 2,634 girls).
** Significantly different from estimate for same group in "not employed" (p < 0.05)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)

. . . and drinking

Full-time students aged 15 to 17 with paid employment were more likely than their non-working counterparts to have consumed alcohol regularly, regardless of the average number of hours worked weekly (Chart 2). About half of those who worked more than 10 hours a week reported regular alcohol consumption, compared with about one-fifth of those who did not have jobs. The relationship between working and alcohol consumption persisted even when controlling for potentially confounding factors such as age (Table 3).

Chart 2
Percentage of full-time students aged 15 to 17 who reported regular alcohol consumption, by average weekly hours worked in past 12 months, household population, Canada, 2003



Data source: 2003 Canadian Community Health Survey
Note: Based on a sample of 5,331 full-time students aged 15 to 17 (2,697 boys and 2,634 girls).
** Significantly different from estimate for same group in "not employed" (p < 0.05)*

. . . and heavy episodic drinking

Having a job was also linked to heavy episodic drinking, which is defined as consuming five or more drinks on one occasion, 12 or more times in the past year. Compared with non-working students, even those who worked few hours were more likely to engage in this behaviour (Chart 3). About 1 in 10 students who worked 5 or fewer hours reported heavy episodic drinking, and almost a quarter of

Table 3
Adjusted odds ratios for health-related behaviours among full-time students aged 15 to 17, by average weekly hours at main job in previous 12 months and selected characteristics, household population, Canada, 2003

	Daily/Occasional smoking		Regular alcohol consumption		Heavy episodic drinking		Physically active in leisure time	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Average weekly hours								
0 (not employed)†	1.0	...	1.0	...	1.0	...	1.0	...
≤5	1.2	0.9, 1.5	1.5*	1.2, 1.8	1.3	0.9, 1.8	1.4*	1.1, 1.7
>5 to ≤10	1.2	0.9, 1.6	2.0*	1.5, 2.6	1.9*	1.3, 2.8	1.8*	1.4, 2.3
>10 to ≤15	1.8*	1.2, 2.7	2.4*	1.7, 3.3	2.9*	1.8, 4.5	1.9*	1.4, 2.6
>15 to ≤20	1.6	1.0, 2.4	2.3*	1.6, 3.3	2.2*	1.4, 3.5	2.6*	1.8, 3.7
>20	1.8*	1.2, 2.9	2.6*	1.7, 3.9	2.6*	1.5, 4.3	1.7*	1.1, 2.4
Age								
15†	1.0	...	1.0	...	1.0	...	1.0	...
16	1.2	0.9, 1.6	1.7*	1.3, 2.1	2.2*	1.6, 3.0	0.9	0.7, 1.1
17	1.8*	1.3, 2.4	2.2*	1.8, 2.8	2.4*	1.7, 3.3	0.6*	0.5, 0.8
Sex								
Girls†	1.0	...	1.0	...	1.0	...	1.0	...
Boys	0.8	0.7, 1.0	1.3*	1.1, 1.6	1.8*	1.4, 2.2	2.1*	1.8, 2.5
Residence								
Rural†	1.0	...	1.0	...	1.0	...	1.0	...
Urban	0.7*	0.6, 0.9	0.8*	0.7, 0.9	0.7*	0.6, 0.9	1.2	1.0, 1.4
Household income								
Lowest/Lower-middle†	1.0	...	1.0	...	1.0	...	1.0	...
Middle	0.9	0.5, 1.4	1.2	0.7, 2.0	0.9	0.5, 1.6	0.9	0.6, 1.4
Upper-middle/Highest	0.6*	0.4, 1.0	1.5	0.9, 2.4	1.0	0.6, 1.7	1.0	0.7, 1.4
Missing	0.8	0.5, 1.1	1.3	0.8, 2.2	0.8	0.5, 1.3	1.0	0.7, 1.4

Data source: 2003 Canadian Community Health Survey
Notes: Separate models were run for each health-related behaviour, based on samples of 5,315, 5,312, 5,300 and 5,205 respondents, respectively. Because of rounding, some odds ratios with 1.0 as upper confidence limit are statistically significant.
† Reference group
** Significantly different from estimate for reference group (p < 0.05)*
... Not applicable

students who worked more than 10 hours did so. Again, the relationships held when age and the other student characteristics were taken into account (Table 3).

Still time for physical activity?

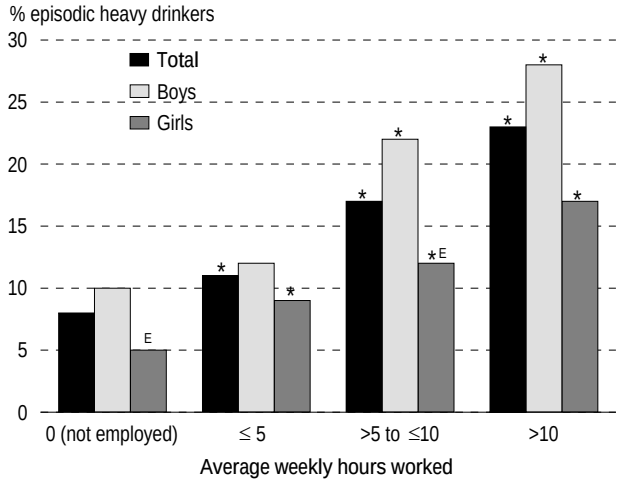
Not all of the behaviours that were more prevalent in working students are negatively related to health. Boys who worked more than 5 hours a week were more likely to report being physically active during leisure time than those who did not have jobs (Chart 4). For girls, a positive relationship between the number of work hours and physical activity emerged only in those who averaged over 10 hours of work per week.

For the two sexes combined, students who worked up to 20 hours a week were more likely to be physically active in their leisure time than those who were not working, but beyond 20 hours, the difference was not statistically significant (data not shown).

Associations between working and physical activity in leisure time persisted at each level of hours worked when the influences of age, sex, household income and urban/rural residence were taken into account (Table 3). The odds of being physically active were almost twice as high for students working more than 5 and up to 15 hours per week, and more than double for those averaging between 15 and up to 20 hours, compared with students who did not work. Beyond 20 hours, the odds of such activity decreased, but remained above those for the non-workers.

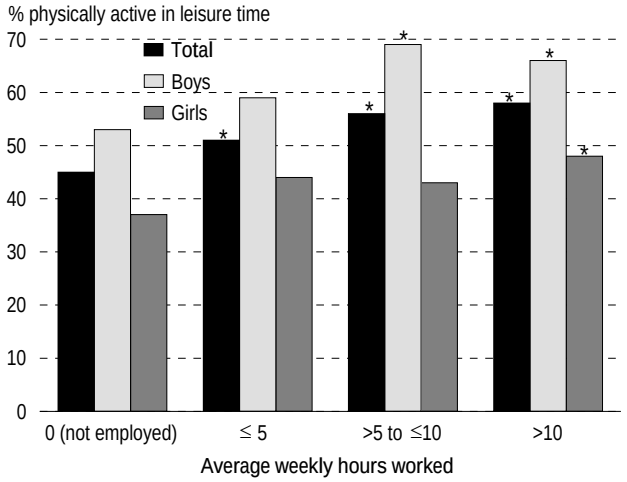
A previous report noted a higher rate of sports participation and a greater likelihood of vigorous exercise in adolescents who worked 1 to 5 hours a

Chart 3
Percentage of full-time students aged 15 to 17 who reported episodic heavy drinking, by average weekly hours worked in past 12 months, household population, Canada, 2003



Data source: 2003 Canadian Community Health Survey
Notes: Based on a sample of 5,331 full-time students aged 15 to 17 (2,697 boys and 2,634 girls).
** Significantly different from estimate for same group in "not employed" ($p < 0.05$)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)

Chart 4
Percentage of full-time students aged 15 to 17 who reported being physically active in leisure time, by average weekly hours worked in past 12 months, household population, Canada, 2003



Data source: 2003 Canadian Community Health Survey
Notes: Based on a sample of 5,331 full-time students aged 15 to 17 (2,697 boys and 2,634 girls).
** Significantly different from estimate for same group in "not employed" ($p < 0.05$)*

Limitations

The data used for this article were based on self- or proxy-reported responses. Responses were not verified by direct measures or independent sources, so their degree of accuracy is unknown. For example, recall errors may affect reported levels of physical activity, and there were no independent sources to confirm if people who reported engaging in specific activities actually did so, or with the frequency and duration reported. It is also possible that respondents may have provided socially desirable responses to questions about smoking, alcohol consumption, physical activity, or hours worked. The extent to which the data are biased, or prevalence has been over- or underestimated, because of these potential sources of error is unknown.

Some students reported more than one job in the past 12 months: 163 in the National Population Health Survey (10% of the weighted sample), and 126 in the Canadian Community Health Survey (2% of the weighted sample). Only information about respondents' main job was used to derive average hours typically worked per week. For those who reported more than one job, it was not possible to determine if any of the total weeks worked at other jobs were concurrent with the weeks worked at the main job. Consequently, their average number of weekly hours worked may have been underestimated.

NPHS data were used to measure behaviours at only two points in time; changes that may have happened before, within or after the two-year interval could not be considered. As well, only information collected at the initial survey about socio-demographic characteristics, such as student employment status and number of hours worked per week, was used.

For the NPHS, it is possible that youth who had left home between survey cycles were more likely to have been non-responders and therefore excluded. As well, some youth were excluded from these analyses because no information was provided about the number of weeks or typical number of hours worked per week. For the CCHS, 154 records from working students were excluded for this reason; for the NPHS, 141 records. Potential bias from these kinds of attrition and exclusions and the impact on associations between employment and changes in health behaviours are not known.

Although the longitudinal NPHS data establish a temporal relationship between employment and health-related behaviours approximately two years later, causality cannot be inferred. Nor can causality be determined using the cross-sectional CCHS data. The associations could be related to other factors not included in the analyses. The mechanisms that underlie associations between work or the number of hours of work and health-related behaviours cannot be determined with these data.

Definitions

In both the Canadian Community Health Survey (CCHS) and the National Population Health Survey (NPHS), *household income* was based on the number of people in the household and total annual household income from all sources in the 12 months before the survey interview. The NPHS analysis used household income reported in the baseline year: 1994/95, 1996/97, 1998/99 or 2000/01, depending on when the student reached the age of 15, 16 or 17.

Income group	Number of household members	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

Household income was regrouped as lowest/lower-middle, middle and upper-middle/highest. When information was not known (refusals, unknowns), the records were grouped as "missing." Information on the students' personal income from work was not available.

Physically active in leisure time was based on total accumulated energy expenditure (EE) calculated from the reported frequency and duration of all of a respondent's leisure-time physical activities in the three months before the CCHS or NPHS interview, and the metabolic energy demand (MET value) of each activity, which was independently established. EE was calculated by multiplying the number of times a respondent engaged in an activity over a 12-month period (a 3-month recall period multiplied by 4) by the average duration in minutes and the energy cost of the activity (kilocalories expended per kilogram of body weight per hour of activity). To calculate the daily energy expenditure for the activity, the yearly estimate was divided by 365. This calculation was repeated for all reported leisure-time activities, and the resulting estimates were summed to provide the aggregate average daily energy expenditure. Respondents whose leisure-time EE was 3.0 kcal/kg/day or more were considered *physically active*. A value between 1.5 and 2.9 kcal/kg/day indicated *moderately active*, and those below 1.5 kcal/kg/day were considered *inactive*. Physical activity during school or in the workplace was not included.

The NPHS category *increased leisure-time physical activity or maintained active status* included respondents who were "active" or "moderately active" according to information reported at the first interview and "active" based on the second interview two years later, as well as those who were "inactive" at the first interview and either "moderately active" or "active" two years later.

Smoking status was derived from questions about current and former behaviour. *Daily/Occasional smokers* were those who reported smoking cigarettes either daily or occasionally at the time of their interview. NPHS respondents who had a smoking status of "never smoked" or "former smoker" at the study baseline, but two years later reported smoking daily or occasionally, were considered to have *initiated daily/occasional smoking*.

Both surveys asked, "During the past 12 months, how often did you drink alcoholic beverages?" For CCHS respondents, *regular drinkers* were those who said that they consumed alcohol once a month or more. For the NPHS analysis, *initiated regular alcohol consumption* represents former drinkers who did not currently drink, or those who had always been abstainers at the first interview, but when surveyed approximately two years later, consumed alcohol once a month or more.

Heavy episodic drinking was measured by asking CCHS respondents the number of times in the past year they had had five or more drinks on one occasion. Those who had done so 12 or more times were classified as having engaged in heavy episodic drinking.

CCHS respondents were classified as *urban or rural residents*. Urban areas are continuously built-up areas with a population concentration of 1,000 or more and a population density of 400 or more per square kilometre, based on the 1996 Census of Population.

week, compared with those not working at all.[15] It also reported a negative association with exercise among adolescents who worked more than 5 hours a week.[15] The differences between those results and the findings of this analysis may reflect the measures of physical activity. In the CCHS, respondents were asked specifically about a range of physical activities and the amount of time spent doing each of them for a specific reference period (see *Definitions*).

Analytical techniques

Canadian Community Health Survey (CCHS) data were weighted to represent the household population of the provinces and territories in 2003. National Population Health Survey (NPHS) data were weighted to represent the household population of the provinces in 1994/95.

Descriptive statistics based on CCHS data for full-time students aged 15 to 17 were used to report the proportion of students in each category of average number of hours worked weekly, by the students' socio-demographic characteristics. Students who had not worked for pay were classified as having worked 0 hours per week (not employed). CCHS data were also used to report employment characteristics by household socio-demographic characteristics. Descriptive statistics based on these data were generated by cross-tabulating the prevalence of health-related behaviours by average number of hours worked weekly in the previous 12 months, and by the student's sex.

Using logistic regression analysis, odds ratios were estimated to examine associations between hours worked and changes in health-related behaviours reported to the NPHS. Socio-demographic factors believed to be associated with health-related behaviours were included as control variables in the regression models. All variables used in the models were dichotomized. The reference case for the regression models was a female, aged 15, with a total annual household income in the lowest to lower-middle category, who was not employed (0 work hours), and, for the CCHS only, who lived in a rural area.

Preliminary analyses of the CCHS data included interaction terms between age and sex in the logistic regression models. However, the odds ratios were not significant (data not shown), so these interaction terms were excluded from the final models.

The NPHS longitudinal file was used to study the relationship between employment status and changes in health-related behaviours between the baseline year (1994/95, 1996/97, 1998/99 or 2000/2001, depending on the year the student reached the age of 15, 16 or 17) and approximately two years later. Employment status and other respondent characteristics used in the NPHS logistic regressions were those reported at the beginning of the two-year period and were assumed to have remained constant over the two years. The possibility that there were differences between the two study conditions (those who had not worked and those who had worked some number of hours) in the average length of time between the baseline interview and the second interview in the subsequent survey cycle was considered. The time between interviews ranged from 455 days to 1,005 days among the students who worked some number of hours (estimated mean 728 days; standard error 2.38), and ranged from 463 days to 1,008 days among the students who had not worked (estimated mean 729 days; standard error 2.63); the respective estimated means were not significantly different ($p < 0.05$).

One goal of this analysis was to see if there was a threshold of average number of weekly work hours above which health-related behaviours were more likely to occur. Models portraying changes to the probability of health-related behaviours as the average number of weekly hours worked increased were run using specified characteristics. Appendix Chart A illustrates the results of four such models for youths with the following characteristics: female, aged 15, lowest/lower-middle household income, rural residence.

To account for survey design effects, the bootstrap technique was used to estimate sampling variances for all reported prevalence estimates and the differences between them, confidence intervals for odds ratios, and covariances of estimated coefficients used in tests for differences.[16-18] A significance level of $p < 0.05$ was established.

Becoming regular drinkers

As no information on the timing of employment in relation to the health-related behaviours can be obtained from the CCHS cross-sectional data, temporal relationships cannot be established. However, data from the NPHS can be used to assess changes in or maintenance of the health-related behaviours among students in relation to their employment status approximately two years earlier (see *Data sources* and *Analytical techniques*).

Even when age and household income were taken into account, students who worked had higher odds of becoming regular drinkers within the next two years than did students who were not employed. This relationship emerged at each level of hours worked (Table 4), but was notably high for students averaging more than 10 hours a week. Their odds of having become regular drinkers were more than three times those of students who had not been working two years earlier. The odds of initiating

Table 4
Adjusted odds ratios for changes in or maintenance of health-related behaviours among full-time students aged 15 to 17, by average weekly hours at main job and selected characteristics, household population, Canada, 1994/95 to 2002/03

	Started daily/ occasional smoking		Started regular alcohol consumption		Increased leisure-time physical activity/ Maintained active status	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Average weekly hours						
0 (not employed)†	1.0	...	1.0	...	1.0	...
≤5	0.9	0.6, 1.5	1.9*	1.3, 2.7	1.3	0.9, 1.8
>5 to ≤10	1.0	0.5, 1.8	2.0*	1.1, 3.4	1.1	0.7, 1.7
>10	1.1	0.6, 2.1	3.1*	1.6, 5.7	1.0	0.7, 1.6
Age						
15†	1.0	...	1.0	...	1.0	...
16	1.3	0.9, 2.0	1.6*	1.1, 2.2	0.9	0.7, 1.3
17	1.3	0.8, 2.2	1.7*	1.2, 2.6	0.7*	0.5, 0.9
Sex						
Girls†	1.0	...	1.0	...	1.0	...
Boys	1.1	0.7, 1.6	1.5*	1.1, 2.1	1.7*	1.3, 2.3
Household income						
Lowest/Lower-middle†	1.0	...	1.0	...	1.0	...
Middle	1.1	0.6, 2.1	0.8	0.4, 1.4	0.8	0.5, 1.3
Upper-middle/Highest	1.1	0.6, 2.1	1.2	0.7, 2.1	1.2	0.8, 1.8
Missing	1.2	0.6, 2.5	0.9	0.5, 1.7	0.9	0.6, 1.4

Data source: 1994/95 to 2002/03 National Population Health Survey, longitudinal square file
Note: Separate models were run for each health-related behaviour, based on samples of 1,231, 1,086 and 1,439 respondents, respectively.
† Reference group
** Significantly different from estimate for reference group (p < 0.05)*
··· Not applicable

regular alcohol consumption were higher for boys than girls and, not surprisingly, increased with each additional year of age.

No associations between working any number of hours and smoking initiation or increase in or maintenance of physical activity level were found in longitudinal analysis.

Concluding remarks

This analysis, based on nationally representative data, adds to the evidence that full-time students of high-school age who work for pay have elevated odds of smoking, drinking alcohol regularly—and heavily on occasion, than their non-working peers. The persistence of these relationships, even when controlling for age, is consistent with findings from other research.[6-8] Individual factors, such as having more spending money, may play a role. Workplace factors, including access to alcohol and tobacco and exposure to co-workers or customers who engage in these behaviours, may also increase the risk for working students.

Although smoking and drinking were associated with employment in cross-sectional analysis, these associations are not necessarily lasting. When students were followed over a two-year period, working was associated with subsequent regular drinking, but not with smoking initiation.

Not all the health behaviours linked with employment or increased hours of work were detrimental. Despite the demands of school and work, students who were employed—even those who averaged over 20 hours a week—had higher odds of being physically active in their leisure time, compared with non-working students. ●

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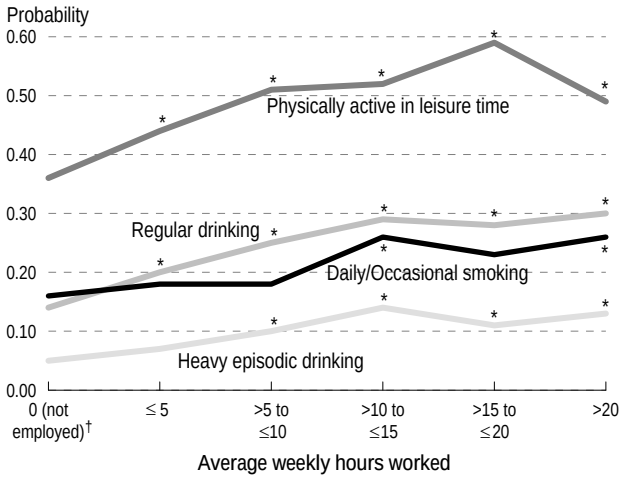
Appendix

Table A
Distribution of full-time students aged 15 to 17, by selected characteristics at baseline, household population, Canada, 1994/95 to 2002/03

	Sample size	Estimated population	
		'000	%
Total	1,598	3,385	100
Sex			
Girls	808	1,714	51
Boys	790	1,671	49
Age			
15	575	1,190	35
16	579	1,309	39
17	444	886	26
Household income			
Lowest/Lower-middle	180	352	10
Middle	369	806	24
Upper-middle/Highest	734	1,565	46
Missing	315	662	20
Average hours worked weekly in 12 months before baseline			
0 (not employed)	722	1,518	45
≤5	459	1,003	30
>5 to ≤10	230	496	15
>10	187	368	11
Smoking/Alcohol use at baseline			
Former smoker/Never smoked	1,237	2,632	78
Not drinking regularly/Never consumed alcohol	1,096	2,324	69
Changes to health-related behaviours at follow-up			
Started daily/occasional smoking	219	433	17
Started regular alcohol consumption	507	1,106	48
Increased leisure-time physical activity/Maintained active status	675	1,455	46

Data source: 1994/95 to 2002/03 National Population Health Survey, longitudinal square file
Note: This sample of 1,598 consists of 15- to 17-year-olds who were full-time students who had not completed a secondary diploma at the beginning of the initial reference period, and who reported their work status for the previous 12 months.

Chart A
Probabilities of selected health-related behaviours for full-time female students aged 15, living in lower-income households in rural areas, as a function of number of hours worked weekly at main job, household population, Canada, 2003



Data source: 2003 Canadian Community Health Survey
Note: The models are based on a sample of 5,331 full-time students aged 15 to 17. The probability of each health-related behaviour is modelled for each increase in range of hours worked weekly.
† Reference category
** Significantly different from those not employed (0 hours) ($p < 0.05$)*

Obesity, overweight and ethnicity

Mark S. Tremblay, Claudio E. Pérez, Chris I. Ardern, Shirley N. Bryan and Peter T. Katzmarzyk

Abstract

Objectives

This article describes the prevalence of self-reported overweight and obesity, based on body mass index (BMI), by ethnicity and examines the influence of time since immigration within and between ethnic groups.

Data sources

Results are based on data from two cycles of Statistics Canada's Canadian Community Health Survey, conducted in 2000/01 and 2003.

Analytical techniques

Weighted prevalences of overweight (BMI ≥ 25) and obesity (BMI ≥ 30) were calculated by sex and ethnicity for the population aged 20 to 64. Multiple logistic regression models were used to examine associations between overweight/obesity and ethnicity, and within and between ethnic groups based on time since immigration, controlling for age, household income, education and physical activity.

Main results

Aboriginal men and women had the highest prevalences of overweight and obesity; East/Southeast Asians, the lowest. Independent of age, household income, education and physical activity, Aboriginal people had elevated odds of overweight and obesity, compared with Whites; South Asians and East/Southeast Asians had significantly lower odds. Recent immigrants (10 years or less) had significantly lower prevalences of overweight, compared with non-immigrants, but this difference tended to disappear over time.

Key words

race, body mass index, immigration, socio-economic status

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In recent decades, the prevalence of obesity and overweight has been rising in Canada,[1-6] a trend consistent with much of the developed and developing world.[7,8] The strong link between obesity and health risk[7,9-12] forecasts severe social and economic consequences.

This rise in obesity reflects an environment that is increasingly conducive to weight gain.[13] Reductions in physical activity and changes in nutritional practices have resulted in a sustained positive caloric balance for many people. However, evidence suggests that the likelihood that an individual will be obese is also influenced by an interaction between genetic predispositions and the environment,[14] which is not the same for all ethnic groups.[15,16] And in addition to potential genetic predispositions, ethnic groups vary on other important determinants of obesity, such as socio-economic status and lifestyle behaviours.

Ethnic differences in obesity and overweight have emerged from analyses of the National Health and Nutrition Examination Survey in the United States.[17,18] In Canada, small regional studies have revealed a higher prevalence of overweight among children and adolescents of First Nations ancestry, compared with those of European ancestry,[19-22] consistent with observations among other Native populations.[24,25] As well, a developing literature suggests that although immigrants to North America are less likely than the host population to be overweight,[26] within two or three generations, the prevalence of overweight among these groups often exceeds that of non-immigrants.[26,27]

Methods

Data source

This analysis is based on data from the 2000/01 and 2003 Canadian Community Health Surveys (CCHS), conducted by Statistics Canada. The CCHS collects cross-sectional information about the health of the household population aged 12 or older in all provinces and territories, except persons living on Indian reserves, on Canadian Forces bases, in institutions (prisons, hospitals, universities) and in some remote areas.

The first cycle (1.1) began in September 2000 and continued over 14 months. Half the interviews were conducted face-to-face. The response rate was 84.7%, yielding a sample of 131,573 respondents. This analysis was restricted to 86,687 respondents aged 20 to 64 for whom body mass index (BMI) data were available, representing an estimated 18.4 million people.

The second cycle (2.1) began in January 2003 and ended in December that year. Unlike the first cycle, most interviews were conducted by telephone, which may have resulted in differentially biased (between cycles) reports of height and weight. The response rate was 80.6%, yielding a sample of 135,573 respondents. This analysis concerns 84,709 respondents aged 20 to 64 for whom BMI data were available, representing an estimated 18.8 million people. More detailed descriptions of the CCHS design, sample and interview procedures can be found in a published report.[23]

The two samples were combined to increase the sample size; thus, the results represent two points in time, 2000/01 and 2003, and an unweighted sample size of 171,396. The sample distribution by ethnicity mirrors that from the 2001 Census.

Analytical techniques

Based on the combined 2000/01 and 2003 sample, prevalence estimates of, and odds ratio estimates for, overweight and obesity by ethnicity were weighted to represent the Canadian household population aged 20 to 64 for both survey years (Appendix Tables A and B). Thus, the weighted total is double that of the Canadian population, but this does not affect prevalence or odds ratio estimates. The logistic regression models were constructed to adjust for age, education, household income and level of leisure-time physical activity (see *Definitions*). Records with missing values for the independent variables were dropped. The models were replicated on subpopulations based on immigrant status and time since immigration (0 to10 years and 11 or more years). For models restricted to immigrants, respondents reporting an ethnicity of North American Aboriginal (7 records) were dropped. To account for the survey design effect, coefficients of variation and p-values were estimated and significance tests were performed using the bootstrap technique.[28,29] The significance level was set at $p < 0.05$.

Limitations

Despite the large, nationally representative sample, this study has a number of limitations. Among the most important is reliance on self-reports. Because the BMI calculations are based on self-reported height and weight, the prevalence of overweight and obesity may be under-estimated.[30,31] In addition, 70% of cycle 2.1 interviews were conducted by telephone versus 50% in cycle 1.1, which further biases self-reported weight.[32] Ethnicity may also influence self-reported height and weight,[33] given different perceptions of body image and body dissatisfaction.[34-38] The physical activity classification, too, is derived from self-reported data, and pertains only to leisure time.

Because of small sample sizes for some ethnic groups (a limitation that was greatly reduced by pooling the two survey cycles), valid estimates of the prevalence of overweight and obesity could be obtained only for broad categories, so valuable information may have been obscured. As well, evidence suggests that the use of the terms “race” and ”ethnicity” may be confusing for survey respondents.[39]

Finally, the results for people of Aboriginal origin show an exceptionally high prevalence of overweight and obesity. However, the data tell only part of the story, as they are limited to the off-reserve population.

Few studies have examined overweight and obesity among ethnic groups in Canada (see *Defining ethnicity*). This data gap arises because ethnicity is not commonly asked on surveys, and when it is, sample sizes are usually too small to yield reliable estimates for specific groups. Cycles 1.1 (2000/01) and 2.1 (2003) of the Canadian Community Health Survey (CCHS), however, each obtained ethnicity information on approximately 130,000 respondents (see *Methods* and *Definitions*). Using combined data from those two CCHS cycles, this article compares overweight and obesity in different ethnic groups, and by immigration status. Because the information is self-reported, the actual extent of overweight and obesity may be underestimated. However, the focus of the analysis is not so much on the prevalence of excess weight as on differences between ethnic groups, which should be less affected by self-report.

Given Canada's multicultural nature,[41] an analysis of overweight and obesity by broad ethnic categories is an important step in identifying high-risk groups. With 18% of the Canadian population born outside the country, and visible minorities accounting for 13% of the population,[41] such analyses can help inform obesity prevention strategies.

Consistent patterns

Analysis of combined data from the 2000/01 and 2003 CCHS shows that the prevalence of overweight and obesity among people aged 20 to 64, based on body mass index (BMI), differed significantly by ethnic group (see *Calculating overweight and obesity*). According to their self-reported height and weight,

Defining ethnicity

The concept of ethnicity is fluid and complex.[40] Distinctions between the terms "ethnicity" and "race" are not clear in the public health literature. "Ethnicity" implies cultural similarities among individuals; "race" implies biological traits indicative of meaningful genetic similarities. In practice, the terms are often used interchangeably, or are combined into a single entity such as "race/ethnicity."[40] For this report, self-ascribed "ethnicity" is used in reference to racially or culturally identifiable subgroups of the Canadian population.

For this analysis, "ethnicity" was based on a question in the Canadian Community Health Survey: "People living in Canada come from many different cultural and racial backgrounds. Are you (the interviewer read categories to the respondent and allowed multiple answers):

1. White?"
2. Chinese?"
3. South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)?"
4. Black?"
5. Filipino?"
6. Latin American?"
7. Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese, etc.)?"
8. Arab?"
9. West Asian (e.g., Afghan, Iranian, etc.)?"
10. Japanese?"
11. Korean?"
12. Aboriginal Peoples of North America (North American Indian, Métis, Inuit/Eskimo)?"
13. Other - Specify"

To avoid restrictive sample sizes, respondents were grouped: White (1), East/Southeast Asian (2, 5, 7, 10, 11), West Asian/Arab (8, 9), South Asian (3), Latin American (6), Black (4), Aboriginal (12) and other (13 - multiple responses across categories defined here, and non-response/don't know/refusal). In this article, these self-ascribed ethnicity categories are used, but when citing supporting literature, the terminology in the cited source has been preserved (for instance, if a source uses "First Nations" or "Native," the term was not changed to "Aboriginal").

Calculating overweight and obesity

Overweight and *obesity* are based on body mass index (BMI), which is calculated by dividing weight in kilograms by height in metres squared. For this analysis, BMI categories were assigned according to Health Canada guidelines,[42] which are applicable to the non-pregnant, non-lactating population aged 18 to 64. Respondents whose BMI was 30 kg/m^2 or more were considered obese; those with a BMI of 25 kg/m^2 or more were considered overweight (overweight includes obesity).

For example, the BMI of an individual 1.7 metres (5 feet 7 inches) tall, weighing 80 kilograms (176 pounds) would be:

$$80 \div 1.7^2 = 27.7 \text{ kg/m}^2$$

which would put him or her in the "overweight" range. If this person weighed 90 kilograms (198 pounds), his or her BMI would be:

$$90 \div 1.7^2 = 31.1 \text{ kg/m}^2$$

and he or she would be "obese."

Definitions

In the Canadian Community Health Survey, *immigrant status* was based on the country of birth given by respondents. Those who specified a country other than Canada were asked if they had been born Canadian citizens. If they said "no," they were determined to be immigrants. Immigrant respondents were asked the year in which they had immigrated to Canada. Comparing that year with the year of the interview made it possible to derive time since immigration.

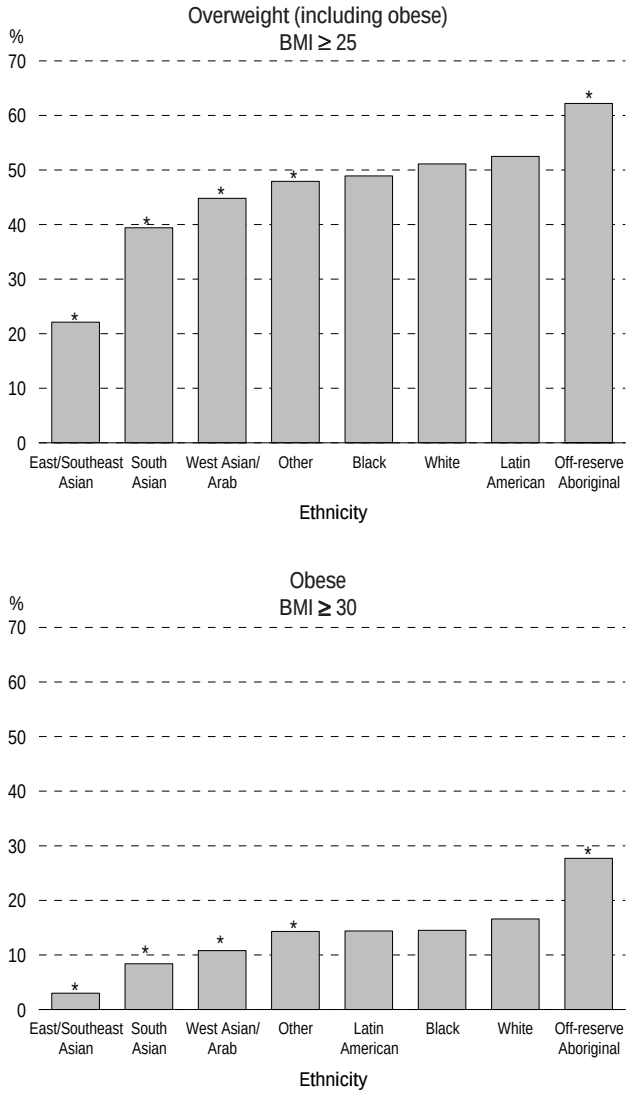
Household income was based on the number of people in the household and total household income from all sources in the 12 months before the interview.

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

Education was grouped into four levels: less than secondary graduation, secondary graduation, some postsecondary, and postsecondary graduation.

Physical activity level was derived by asking respondents if they had participated in any of the following activities during their leisure time in the past three months: walking for exercise, gardening or yard work, swimming, bicycling, popular or social dance, home exercises, ice hockey, ice skating, in-line skating or rollerblading, jogging or running, golfing, exercise class or aerobics, downhill skiing or snowboarding, bowling, baseball or softball, tennis, weight-training, fishing, volleyball, basketball, soccer, and any additional physical activities not specified by the interviewer. They were then asked the number of times they engaged in the activity and the average duration per session. These data were used together with the MET value associated with each activity (metabolic energy cost of the activity) to arrive at an energy expenditure value for each respondent, expressed in kilocalories per kilogram of body weight per day (kcal/kg/day). Physical activity level was categorized as: inactive (0 to 1.49 kcal/kg/day), moderately active (1.5 to 2.99 kcal/kg/day) or active (3.0 or more kcal/kg/day).

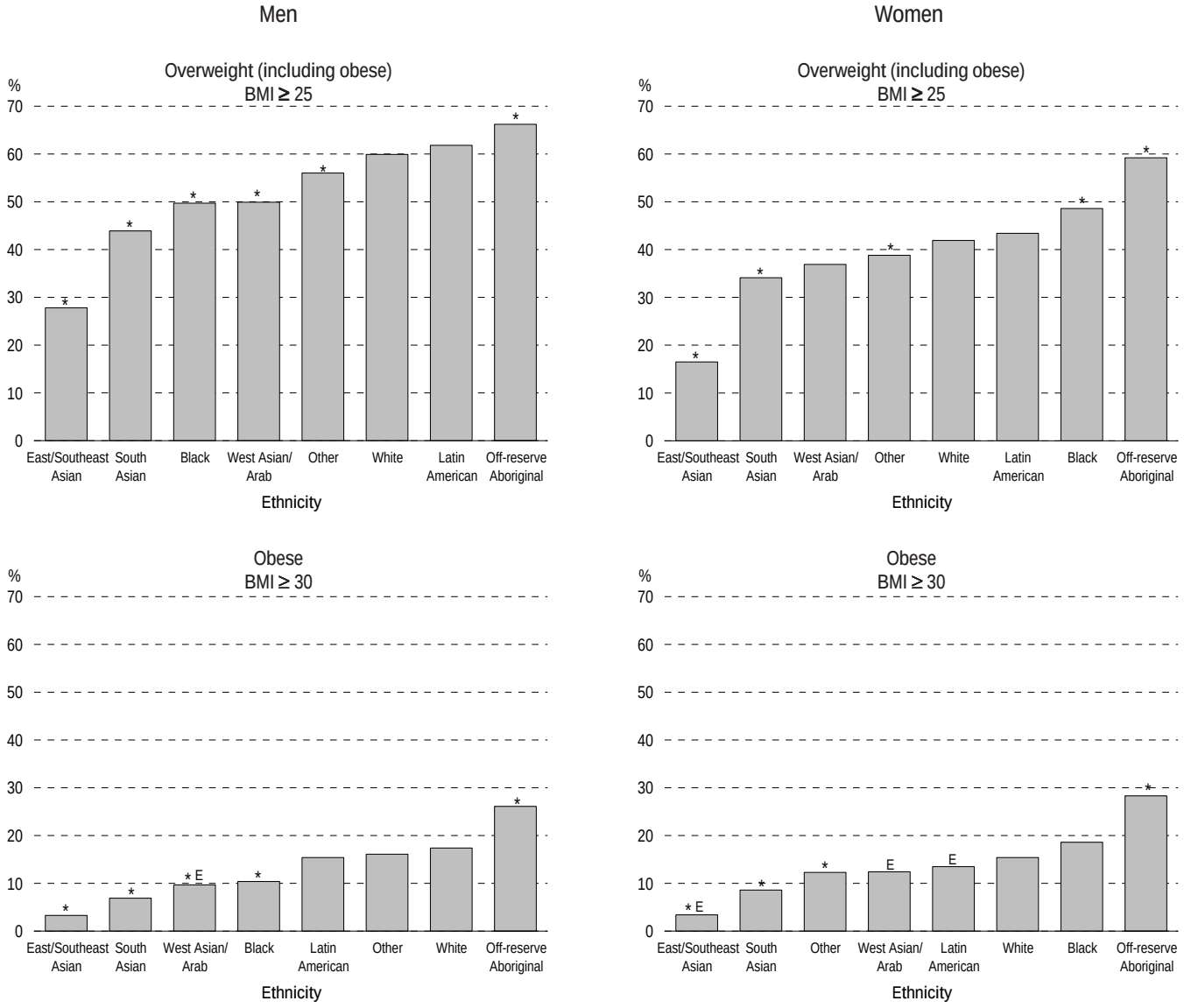
Chart 1
Prevalence of overweight and obesity, by ethnicity, household population aged 20 to 64, Canada, 2000/01 and 2003 combined



Data source: 2000/01 and 2003 Canadian Community Health Survey
** Significantly different from estimate for White (p < 0.05)*

about half of Whites (who constituted more than 80% of the population) were overweight (including people who were obese). East/Southeast Asians had the lowest self-reported prevalence of overweight (22%), while off-reserve Aboriginal people had the highest (63%) (Chart 1). Just 3% of East/Southeast Asians were obese, compared with 17% of Whites and 28% of Aboriginal people.

Chart 2
Prevalence of overweight and obesity, by sex and ethnicity, household population aged 20 to 64, Canada, 2000/01 and 2003 combined



Data source: 2000/01 and 2003 Canadian Community Health Survey
** Significantly different from estimate for White (p < 0.05)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)

These patterns prevailed among both sexes (Chart 2).

The likelihood of being overweight or obese is influenced by many factors besides ethnicity, including demographic characteristics, socio-economic status, and lifestyle. In fact, among men, the odds of overweight and obesity increased with age (Table 1). As well, low education and low levels of physical activity were significantly associated with overweight and obesity among men. Low income, by contrast, appeared to be protective from overweight, though not from obesity.

Even when the effects of age, education, household income and physical activity were taken into account, ethnic differences in overweight and obesity persisted among men. Aboriginal men had

Table 1
Adjusted odds ratios relating ethnicity and selected characteristics to overweight and obesity, by sex, household population aged 20 to 64, Canada, 2000/01 and 2003 combined

	Overweight (BMI ≥ 25)				Obesity (BMI ≥ 30)			
	Men		Women		Men		Women	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Ethnicity								
White†	1.0	...	1.0	...	1.0	...	1.0	...
Aboriginal (off-reserve)	1.7*	1.4, 2.0	2.0*	1.7, 2.3	1.7*	1.4, 2.1	2.0*	1.7, 2.4
Latin American	1.2	0.9, 1.6	1.2	0.9, 1.6	1.0	0.7, 1.6	0.8	0.5, 1.3
Other/Multiple/Unknown	0.9	0.8, 1.1	1.1	0.9, 1.3	1.0	0.8, 1.3	0.9	0.7, 1.2
West Asian/Arab	0.8	0.6, 1.0	0.7*	0.5, 1.0	0.5*	0.4, 0.8	0.6*	0.4, 0.9
Black	0.7*	0.5, 0.9	1.2	1.0, 1.5	0.5*	0.4, 0.7	1.0	0.7, 1.4
South Asian	0.6*	0.5, 0.7	0.7*	0.6, 0.9	0.5*	0.3, 0.6	0.4*	0.3, 0.6
East/Southeast Asian	0.3*	0.2, 0.3	0.3*	0.2, 0.3	0.2*	0.1, 0.2	0.2*	0.1, 0.2
Age group								
20-34†	1.0	...	1.0	...	1.0	...	1.0	...
35-49	1.7*	1.6, 1.8	1.5*	1.5, 1.6	1.2*	1.2, 1.3	1.4*	1.3, 1.5
50-64	2.0*	1.8, 2.1	2.5*	2.4, 2.7	1.5*	1.4, 1.6	1.8*	1.7, 2.0
Household income								
Lowest	0.5*	0.5, 0.6	1.1	1.0, 1.2	0.9	0.7, 1.0	1.4*	1.2, 1.6
Lower-middle	0.7*	0.6, 0.8	1.3*	1.2, 1.5	1.0	0.8, 1.1	1.6*	1.4, 1.8
Middle	0.7*	0.7, 0.8	1.3*	1.2, 1.4	0.9	0.8, 1.0	1.5*	1.4, 1.6
Upper-middle	0.9*	0.8, 0.9	1.2*	1.1, 1.3	1.0	0.9, 1.0	1.3*	1.2, 1.4
Highest†	1.0	...	1.0	...	1.0	...	1.0	...
Education								
Less than secondary graduation	1.1*	1.0, 1.2	1.5*	1.4, 1.6	1.3*	1.2, 1.4	1.5*	1.3, 1.6
Secondary graduation	1.1*	1.0, 1.2	1.2*	1.2, 1.3	1.2*	1.1, 1.3	1.2*	1.1, 1.3
Some postsecondary	1.0	0.9, 1.1	1.1*	1.0, 1.2	1.1	0.9, 1.2	1.2*	1.1, 1.3
Postsecondary graduation†	1.0	...	1.0	...	1.0	...	1.0	...
Physical activity								
Active†	1.0	...	1.0	...	1.0	...	1.0	...
Moderate	1.2*	1.1, 1.2	1.4*	1.3, 1.4	1.4*	1.3, 1.5	1.4*	1.3, 1.6
Inactive	1.1*	1.1, 1.2	1.6*	1.5, 1.7	1.6*	1.5, 1.7	1.9*	1.8, 2.1

Data source: 2000/01 and 2003 Canadian Community Health Survey
Notes: Because of rounding, some confidence intervals with 1.0 as lower/upper limit are significant.
† Reference category
** Significantly different from estimate for reference category (p < 0.05)*
... Not applicable

significantly high odds of both overweight and obesity, compared with White men; the odds were significantly lower among East/Southeast Asian, South Asian, and Black men. West Asian/Arab men had low odds of obesity, but they were no more or less likely than White men to be overweight.

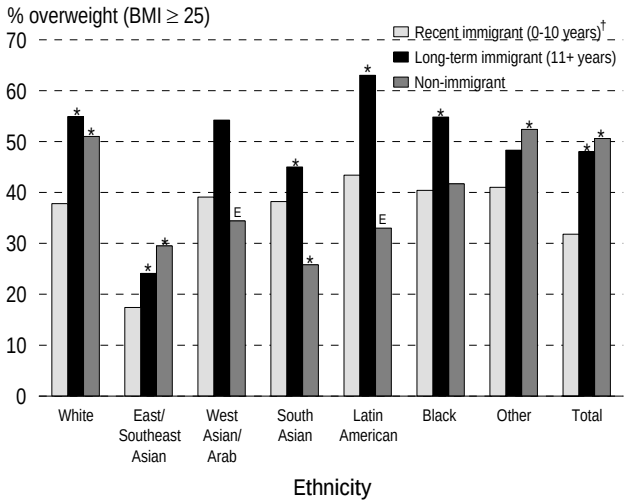
For women, the relationship between ethnicity and overweight and obesity was generally similar to that for men. Compared with White women, those of Aboriginal origin had twice the odds of being overweight or obese, while East/Southeast Asian, South Asian and West Asian/Arab women had low odds. However, unlike their male counterparts, the odds that Black women would be overweight or obese did not differ significantly from those of White women.

As was the case among men, women's odds of overweight and obesity rose with age. Low levels of physical activity and low educational attainment were also associated with marked increases in the odds of overweight and obesity in women. In contrast to the situation among men, living in a lower-income household was an important predictor of both overweight and obesity among women.

Time since immigration

Some of the differences in the self-reported prevalence of overweight and obesity between

Chart 3
Prevalence of overweight, by ethnicity and immigrant status, household population aged 20 to 64, Canada, 2000/01 and 2003 combined



Data source: 2000/01 and 2003 Canadian Community Health Survey
† Reference category
** Significantly different from estimate for recent immigrant (p < 0.05)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)

ethnic groups can be accounted for by birthplace and time since immigration to Canada (Chart 3). The prevalence of overweight and obesity was higher among long-term (11 or more years) than more recent immigrants (10 years or less).

The higher prevalence of overweight among long-term immigrants supports the notion that a "healthy immigrant" effect fades within a decade for all ethnic groups. These findings mirror those of previous Canadian[26,43] and American[44] studies. Thus, although the prevalence of overweight is relatively low among some immigrant groups, it is likely to rise as time passes. The increase in BMI may result from transitions away from cultural diets and lifestyle patterns to a more "western" diet and sedentary lifestyle, or some combination of the two.

Nonetheless, among both recent and long-term immigrants, ethnic differences were apparent. Even when the effects of age, household income, education and physical activity were taken into account, East/Southeast Asian immigrant men and women generally had lower odds of being overweight than did White immigrants (Table 2). Regardless of when they immigrated, Black women had higher odds of overweight, compared with White immigrant women. This was also true for female long-term immigrants from Latin America.

Pattern prevails among non-immigrants

Even among non-immigrants, the ethnic patterns of overweight prevailed. The odds of being overweight were low among non-immigrants of South Asian and East/Southeast Asian descent, compared with Whites. This held for both men and women, and persisted when age, educational attainment, household income and physical activity were taken into account.

While the low prevalence of overweight and obesity in East/Southeast Asians is consistent with other data,[45,46] it may be deceptive. Body mass index offers little insight into potential ethnic differences in absolute levels of adiposity, the distribution of body fat, or subsequent health consequences. After adjusting for BMI, it has been shown that Asians have a greater percentage of body fat than their European or White counterparts.[47-49] Indeed, recent studies have documented an increased prevalence of several metabolic disorders among Asians with a BMI of 23 to 24, suggesting that the threshold of 25 may be too high to identify those at increased risk.[46,50]

More broadly, mounting evidence indicates that current general body weight guidelines may be inadequate for identifying health risk equally in all ethnic groups.[45,51-53] The need for research in this area has been acknowledged in the Canadian Guidelines for Body Weight Classification in Adults.[42]

The high prevalence of overweight and obesity among Aboriginal people in this analysis echoes the findings of community-based studies[6,19,22,54] and results using directly measured height and weight from smaller samples.[19,55] These studies suggest that Aboriginal people should be considered at especially high risk for obesity and related co-morbidities.

Table 2
Adjusted odds ratios relating ethnicity to overweight, by sex and immigrant status, household population aged 20 to 64, Canada, 2000/01 and 2003 combined

	Recent immigrants (0 to 10 years)		Long-term immigrants (11 years or more)		Non-immigrants	
	Adjusted odds ratio‡	95% confidence interval	Adjusted odds ratio‡	95% confidence interval	Adjusted odds ratio‡	95% confidence interval
Total						
White†	1.0	...	1.0	...	1.0	...
East/Southeast Asian	0.3*	0.3, 0.4	0.3*	0.3, 0.4	0.5*	0.4, 0.7
West Asian/Arab	1.3	0.9, 1.8	1.0	0.7, 1.5	0.8	0.4, 1.6
South Asian	1.0	0.8, 1.3	0.8*	0.7, 1.0	0.5*	0.3, 0.8
Latin American	1.6*	1.0, 2.5	1.6*	1.2, 2.2	0.5	0.2, 1.3
Black	1.2	0.8, 1.7	1.1	0.9, 1.4	0.8	0.6, 1.1
Aboriginal (off-reserve)	...	...	...	...	1.8*	1.6, 2.0
Other	1.2	0.8, 1.6	0.9	0.7, 1.1	1.3*	1.2, 1.5
Men						
White†	1.0	...	1.0	...	1.0	...
East/Southeast Asian	0.3*	0.2, 0.5	0.2*	0.2, 0.3	0.6*	0.4, 0.8
West Asian/Arab	1.0	0.6, 1.6	0.9	0.5, 1.5	0.7	0.2, 2.1
South Asian	0.8	0.5, 1.1	0.7*	0.5, 0.9	0.5*	0.3, 1.0
Latin American	1.8	0.9, 3.5	1.2	0.7, 1.8	1.3	0.3, 6.4
Black	0.7	0.4, 1.2	0.7	0.5, 1.0	0.7	0.5, 1.2
Aboriginal (off-reserve)	...	...	...	...	1.7*	1.4, 2.1
Other	0.9	0.6, 1.5	0.7*	0.5, 1.0	1.3*	1.1, 1.6
Women						
White†	1.0	...	1.0	...	1.0	...
East/Southeast Asian	0.3*	0.2, 0.5	0.4*	0.3, 0.5	0.4*	0.3, 0.6
West Asian/Arab	1.2	0.6, 2.2	1.0	0.6, 1.7	0.7	0.2, 1.8
South Asian	1.4	0.9, 2.1	0.9	0.7, 1.2	0.4	0.2, 1.2
Latin American	1.6	0.8, 3.0	2.1*	1.4, 3.4	0.3	0.1, 1.2
Black	1.9*	1.1, 3.2	1.6*	1.2, 2.2	0.9	0.5, 1.5
Aboriginal (off-reserve)	...	...	...	...	2.0*	1.7, 2.3
Other	1.6	0.9, 2.7	1.0	0.7, 1.4	1.4*	1.1, 1.7

Data source: 2000/01 and 2003 Canadian Community Health Survey
Notes: Overweight is body mass index ≥ 25; obese is body mass index ≥ 30. Because of rounding, some confidence intervals with 1.0 as lower/upper limit are significant.
† Reference category
‡ Controls for age, household income, education and physical activity.
** Significantly different from estimate for reference category (p < 0.05)*
... Not applicable

Concluding remarks

Analysis of data from the Canadian Community Health Survey reveals strong associations between ethnicity and the prevalence of overweight and obesity. These differences remain significant even when the effects of age, socio-economic status, physical activity and birthplace are taken into account.

Beyond genetic predispositions, ethnic groups have different social pressures and norms surrounding "acceptable" body weight ranges,[38] which may partially explain some of the variations in obesity that emerged from this analysis of CCHS data. Cultural norms related to physical activity (sex-specific, age-specific, sport-specific, perception of intensity, etc.) and nutrition (dietary customs, acceptable foods and quantities) may also contribute to the differences.

With a substantial and growing proportion of the Canadian population overweight,[56] analysis of the problem by ethnicity is warranted. The information is particularly important given the emerging epidemic of type-2 diabetes,[57] which affects some ethnic groups, notably Aboriginal people, disproportionately.[58,59]

In light of Canada's increasing ethnic diversity, it is important to understand the social and environmental contexts in which different ethnic groups develop overweight, obesity and related metabolic disorders. Such information makes it possible to identify those at high risk and to target prevention and intervention strategies. ●

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Appendix

Table A
Distribution of household population aged 20 to 64, by ethnicity

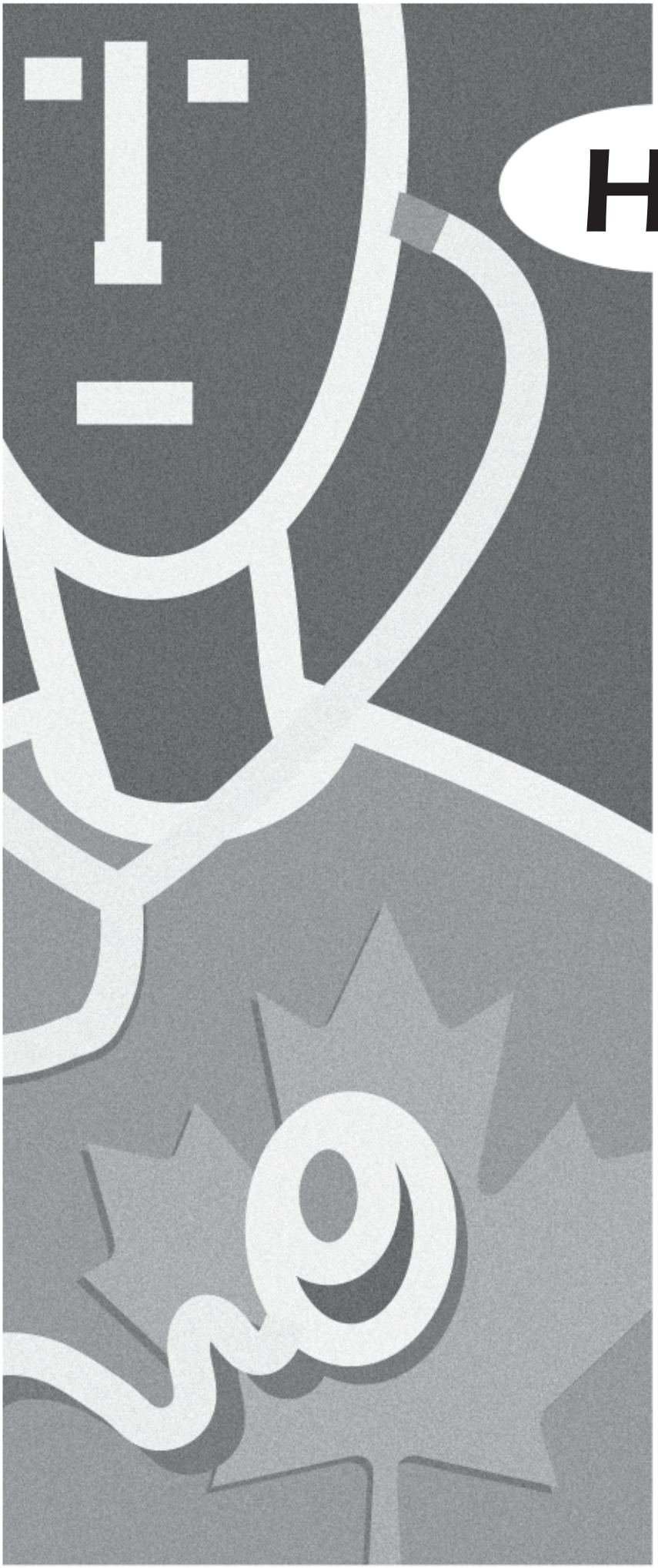
	Sample size		Estimated population	
		%	'000	%
Cycle 1.1 (2000/01)				
Total	86,687	100.0	18,381	100.0
White	77,412	89.3	15,482	84.2
East/Southeast Asian	2,597	3.0	1,048	5.7
West Asian/Arab	367	0.4	164	0.9
South Asian	1,031	1.2	526	2.9
Latin American	305	0.4	133	0.7
Black	691	0.8	318	1.7
Aboriginal (off-reserve)	2,265	2.6	198	1.1
Other/Multiple/Unknown	2,019	2.3	512	2.8
Cycle 2.1 (2003)				
Total	84,709	100.0	18,788	100.0
White	73,329	86.6	15,217	81.0
East/Southeast Asian	2,516	3.0	1,123	6.0
West Asian/Arab	389	0.5	170	0.9
South Asian	1,045	1.2	534	2.8
Latin American	383	0.5	190	1.0
Black	751	0.9	322	1.7
Aboriginal (off-reserve)	2,455	2.9	200	1.1
Other/Multiple/Unknown	3,841	4.5	1,032	5.5

Data source: 2000/01 and 2003 Canadian Community Health Survey

Table B
Distribution of selected characteristics, by body mass index, household population aged 20 to 64, Canada, 2000/01 and 2003 combined

	Total			Overweight (BMI ≥ 25)†			Obese (BMI ≥ 30)		
	Sample size	Estimated population		Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%		'000	%
Total	171,396	37,169.2	100.0	89,921	18,202.3	100.0	30,732	5,745.7	100.0
Sex									
Men	82,899	19,064.5	51.3	50,381	10,906.5	59.9	15,656	3,123.8	54.4
Women	88,497	18,104.7	48.7	39,540	7,295.8	40.1	15,076	2,621.9	45.6
Age group									
20-34	49,831	12,017.9	32.3	21,504	4,656.1	25.6	7,253	1,433.0	24.9
35-49	66,427	14,971.2	40.3	34,694	7,511.9	41.3	11,633	2,314.4	40.3
50-64	55,138	10,180.0	27.4	33,723	6,034.3	33.2	11,846	1,998.3	34.8
Ethnicity									
White	150,741	30,699.2	82.6	80,474	15,683.5	86.2	27,537	5,082.6	88.5
East/Southeast Asian	5,113	2,170.2	5.8	1,211	480.6	2.6	190	65.9	1.1
West Asian/Arab	756	334.8	0.9	350	149.8	0.8	95	36.0	0.6
South Asian	2,076	1,060.0	2.9	839	418.1	2.3	179	89.9	1.6
Latin American	688	322.8	0.9	349	169.4	0.9	100	46.6	0.8
Black	1,442	640.7	1.7	722	313.3	1.7	220	93.1	1.6
Aboriginal (off-reserve)	4,720	397.7	1.1	3,033	248.5	1.4	1,425	110.3	1.9
Other/Multiple/Unknown	5,860	1,543.8	4.2	2,943	739.2	4.1	986	221.3	3.9
Immigrant status									
Non-immigrant	146,948	28,690.2	77.2	78,810	14,565.1	80.0	27,677	4,796.4	83.5
Recent immigrant (≤ 10 years)	5,459	2,320.6	6.2	1,827	737.9	4.1	412	153.6	2.7
Long-term immigrant (11+ years)	15,997	5,307.6	14.3	7,915	2,547.4	14.0	2,250	700.8	12.2
Missing	2,992	850.8	2.3	1,369	351.9	1.9	393	95.0	1.7
Education									
Less than secondary graduation	31,136	5,650.2	15.2	18,497	3,224.7	17.7	7,252	1,222.1	21.3
Secondary graduation	33,297	7,393.9	19.9	17,693	3,686.0	20.3	6,044	1,186.3	20.6
Some postsecondary	13,315	3,115.6	8.4	6,537	1,393.4	7.7	2,253	447.4	7.8
Postsecondary graduation	91,366	20,461.7	55.1	45,915	9,615.2	52.8	14,724	2,799.4	48.7
Missing	2,282	547.8	1.5	1,279	283.0	1.6	459	90.5	1.6
Household income									
Lowest	7,360	1,115.2	3.0	3,598	483.5	2.7	1,514	183.5	3.2
Lower-middle	10,651	1,866.9	5.0	5,400	891.3	4.9	2,232	337.5	5.9
Middle	29,818	5,939.0	16.0	15,376	2,863.5	15.7	5,782	1,000.6	17.4
Upper-middle	56,770	11,841.5	31.9	30,330	5,924.3	32.5	10,251	1,893.8	33.0
Highest	49,798	12,443.1	33.5	26,831	6,248.3	34.3	8,300	1,792.5	31.2
Missing	16,999	3,963.5	10.7	8,386	1,791.5	9.8	2,653	537.8	9.4
Physical activity									
Active	39,265	8,189.4	22.0	18,762	3,681.6	20.2	5,045	898.9	15.6
Moderate	41,849	8,838.5	23.8	21,742	4,337.7	23.8	6,997	1,296.0	22.6
Inactive	84,553	18,552.1	49.9	46,462	9,458.5	52.0	17,824	3,346.1	58.2
Missing	5,729	1,589.2	4.3	2,955	724.6	4.0	866	204.7	3.6

Data source: 2000/01 and 2003 Canadian Community Health Survey
Note: Because of rounding, details may not add to totals.
† Includes obese



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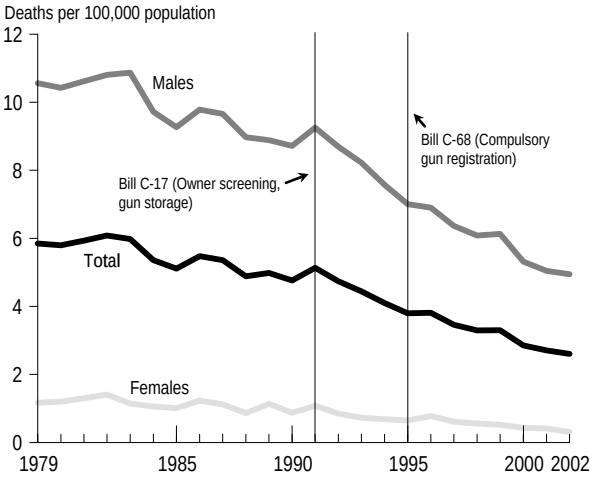
DEATHS INVOLVING FIREARMS

by Kathryn Wilkins

In 2002, 816 Canadians died from firearms-related injuries (see *Gun control laws*). This amounted to 2.6 deaths per 100,000 population. The number of such deaths among males far outnumbered that for females: 767 versus 49, representing rates of 4.9 and 0.3 deaths per 100,000 population, respectively. These figures are based on the most recent data available from the Canadian Mortality Data Base, which comprises information from death certificates.

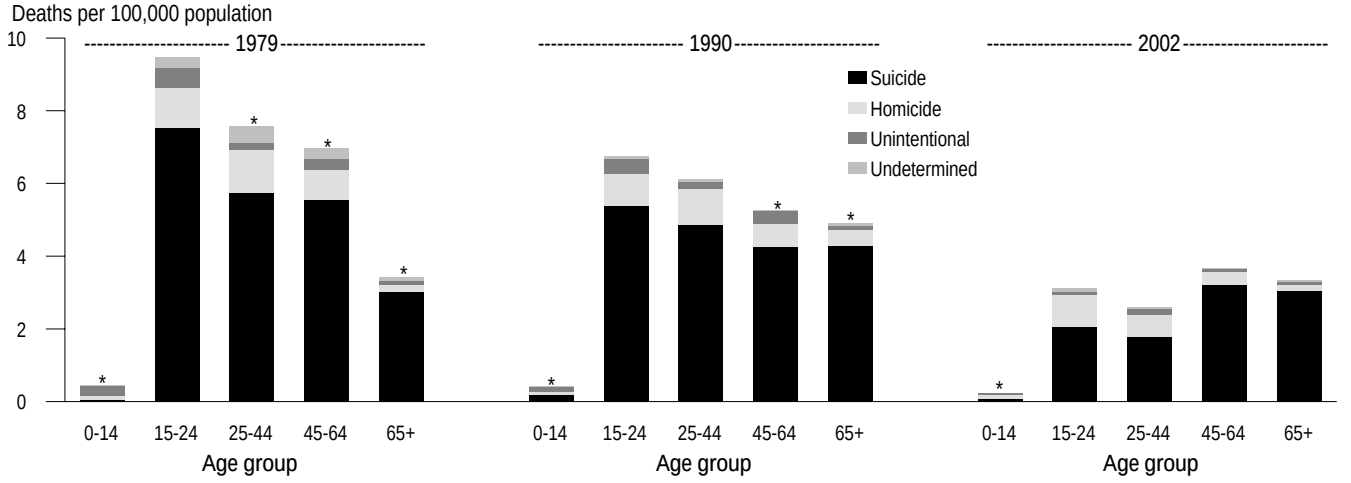
The rates of deaths related to firearms have declined over the past couple of decades. Between 1979 and 2002, the male rate fell from 10.6 to 4.9 deaths per 100,000 population and the female rate, from 1.2 to 0.3 (Table A). In other words, over this 23-year period, the rate for males fell by just over one-half; the rate for females, by three-quarters.

Rate of death from injury involving firearm—by sex



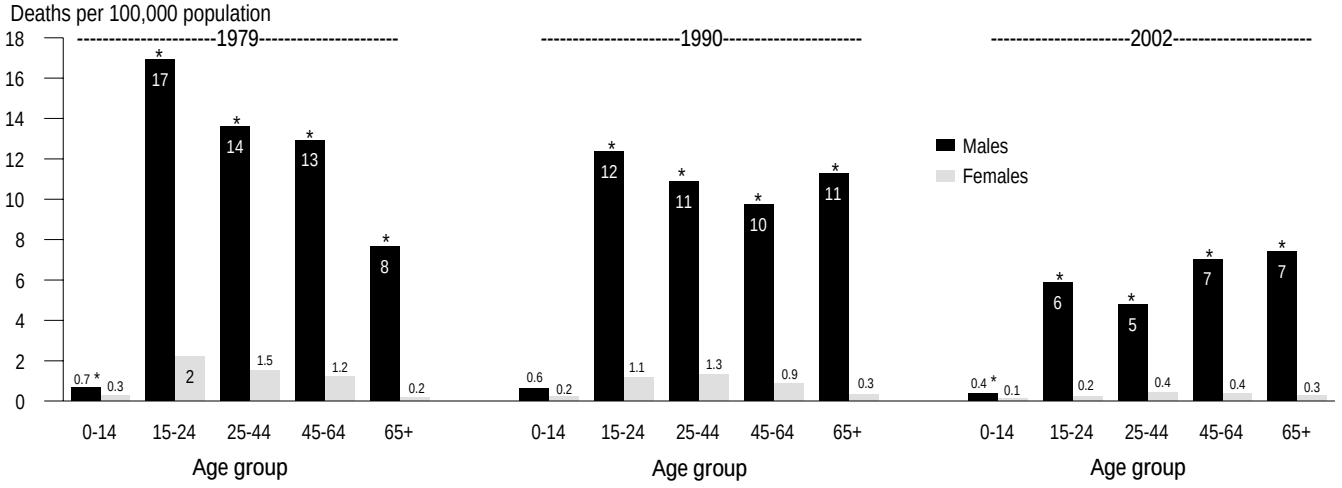
Data source: Canadian Mortality Database

Rate of death from injury involving firearm—by manner/intent and age group



Data source: Canadian Mortality Database
**Significantly different from rate for 15-to-24 age group in same year ($p < 0.05$)*

Rate of death from injury involving firearm—by sex and age group



Data source: Canadian Mortality Database
**Significantly higher than rate for females (p < 0.05)*

Age gradient declines

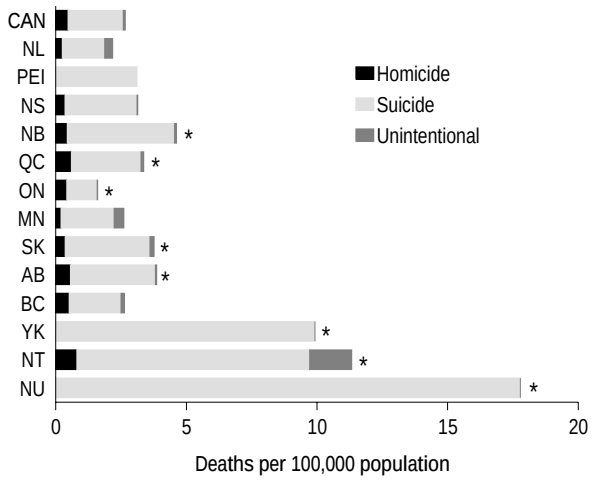
In 1979, the rate of deaths related to firearms was highest among 15- to 24-year-olds (see also Table B). By 1990, the age gradient had decreased somewhat, and by 2002, differences between age groups had largely disappeared for people aged 15 or older. Sizable decreases in death rates—particularly notable for suicides involving firearms—in the 15-to-24 and 25-to-44 age groups accounted for most of the levelling over age groups that had occurred by 2002.

Rates higher in North

The average annual rate of firearms-related deaths for 2000-2002 was significantly higher in the territories than in Canada as a whole . Rates in several provinces also differed significantly from the national rate. In New Brunswick, Québec, Saskatchewan and Alberta, the rate was higher; in Ontario, it was lower (see also Table C).

In Montreal, Calgary, Vancouver and Toronto, Canada's four largest census metropolitan areas (CMAs), the overall rates of deaths related to firearms differed somewhat. The only statistically significant difference emerged between Montreal and Toronto: 2.2 versus 1.3 firearms-related deaths per 100,000 population. Differences in rates of homicide and suicide among the four large cities were not statistically significant.

Average annual rate of death (2000-2002) from injury involving firearm—by manner/intent and province/territory

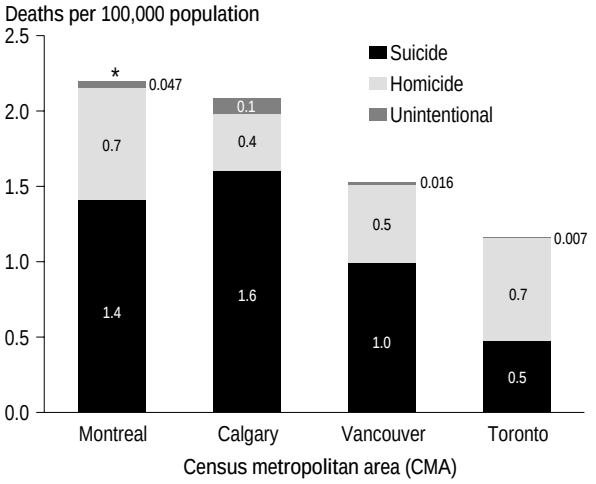


Data source: Canadian Mortality Database
** Combined rate signficantly different from estimate for Canada (p < 0.05)*

Most are suicides

In each year from 1979 to 2002, about four-fifths of all firearms-related deaths were

Average annual rate of death (2000-2002) from injury involving firearm—by manner/intent for selected CMAs



Data source: Canadian Mortality Database
** Combined rate signficantly higher than that for Toronto ($p < 0.05$)*

suicides. Homicides usually accounted for around 15%, and about 4% of deaths involving a firearm were unintentional.

Beginning in the mid-1980s through 2002, the rate of suicide involving a firearm fell from 5 to 2 deaths per 100,000. The falling rate of firearms-related suicides is reflected in a declining use of shooting as a means of committing suicide. Among all suicides committed from 1979 and throughout the 1980s, around one-third involved firearms. Beginning in the early 1990s, this share began to drop, and by 2002, about 1 in 6 suicides was carried out with a firearm. As gun-related suicides declined, suicide by suffocation/hanging became more common: the rate rose from about 3 to 5 deaths per 100,000. Still, the downturn in firearms-related suicides contributed to a decline in the overall suicide rate, which fell from about 14 to 12 deaths per 100,000 population.

The decline in the rate of suicides related to firearms accounted for most of the decrease in the firearms-related death rate.

Gun control laws

In Canada, laws regulating guns date back more than a century. Even before the first Criminal Code in 1892, Justices of the Peace had the authority to jail anyone who carried a handgun but had no reason to fear an assault against their life or property.[1] Then in 1892, the Criminal Code required that handgun owners who could not sufficiently justify ownership have a basic permit to carry their pistol. A 1934 law was the first to require handgun owners to formally register their guns, and the records were maintained regionally by designated police departments or by the Royal Canadian Mounted Police. When the handgun registry was centralized in 1951, the registration of automatic firearms also became mandatory.

More recent firearm restrictions were enacted in 1977 (Bill C-51), 1991 (Bill C-17) and 1995 (Bill C-68). The 1977 law mandated that people acquiring a firearm have a Firearms Acquisitions Certificate attesting that they are at least 16 years of age and have no criminal record or history of mental illness. The later legislation reduced the availability of and accessibility to firearms, requiring more extensive background screening of prospective purchasers, registration of all guns owned, and safe storage of these weapons. Compulsory registration, which allowed each gun acquired to be linked to its owner, also required that spouses and former spouses be notified about the gun's acquisition.

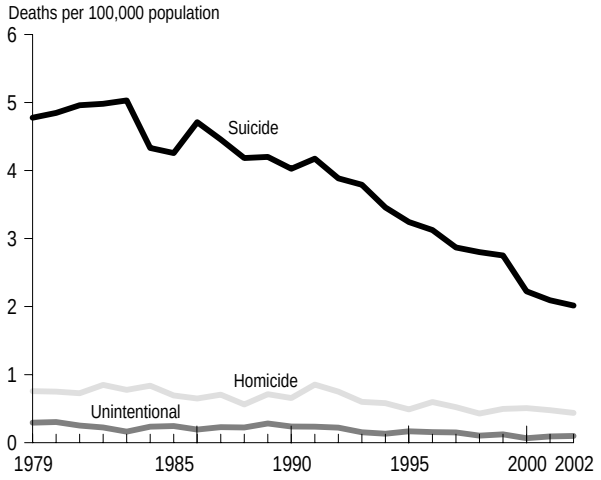
In 1995, when gun registration became compulsory, the death rate for firearms-related injuries was 3.8 per 100,000 population. Over the following years, the rate, which had been falling quite steadily since the early 1990s, continued to drop. Of course, it is difficult to measure the contribution that gun control regulations may have made to this decrease.

Homicides down

The rate of homicides involving a firearm fell from 0.8 deaths per 100,000 population in the early 1980s to 0.4 in 2002. This trend mirrored a decline in the overall homicide rate, although the share of homicides in which a firearm was used remained fairly stable over the entire period, at just under one-third.

A report based on police records indicates that handguns accounted for two-thirds of firearm

Rate of death from injury involving firearm—by manner/ intent



Data source: Canadian Mortality Database

homicides in 2002, up from about one-half during the 1990s.[2] Rifles and shotguns accounted for one-quarter of all homicides involving firearms; the remainder were committed with other types of firearms (data not shown).

Unintentional deaths

In 1979, 71 Canadians died from unintentional firearms-related injuries, representing a rate of 3 deaths per million population. People younger than 25 accounted for the majority (60%) of these deaths: 16 were in children under 15, and 27 occurred in the 15-to-24 age group.

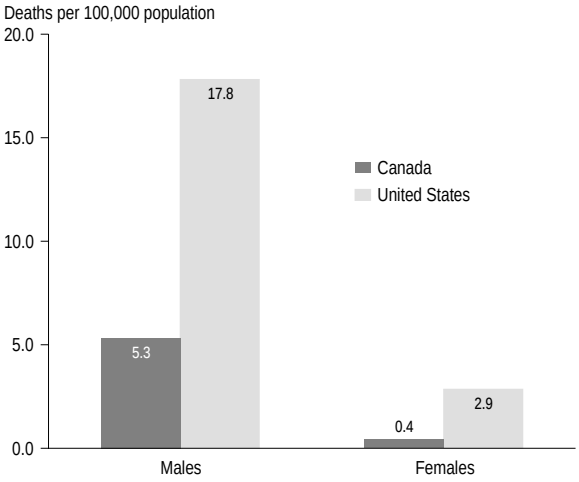
During the 1990s, the rate of unintentional fatalities related to firearms fell fairly steadily, and by 2002, it was one-third the 1979 level. In 2002, 31 people were unintentionally killed by firearms. Three of these victims were younger than 15, and another three were between 15 and 24. Decreases in the death rates in these age groups accounted for much of the decrease in the overall rate of unintentional firearms-related deaths between 1979 and 2002.

Canadian and US rates

The risk of death from a firearms-related injury in Canada is a fraction of that in the United States. In 2000, American males had more than three times the risk of dying from injuries related to firearms when compared with their Canadian counterparts. The excess was even greater for US females—seven times as high.[3]

Firearm homicide rates in the United States are strikingly higher than in Canada. In 2000, the rate of homicide involving a gun was 3.8 per 100,000 population in the United States, nearly eight times as high as Canada's rate of 0.5.[3] In Canada, homicides accounted for 18% of deaths involving firearms in 2000, compared with 38% in the United States.[4]

Rates of death from injury involving firearm—Canada and the United States, 2000



Data sources: Canadian Mortality Database; United States National Center for Injury Prevention and Control, Centers for Disease Control and Prevention

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Data sources

Data on firearms-related deaths in Canada are from the Canadian Mortality Data Base, and they are based on information abstracted and compiled from death certificates. The figures for the United States are from the National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.[3]

Causes of death for deaths occurring between 1979 and 1999 were defined according to the *International Classification of Diseases, Ninth Revision* (ICD-9),[5] and those occurring between 2000 and 2002 were defined according to the tenth revision of this volume (ICD-10).[6]

The ICD-9 codes corresponding to the categories used in this article are:

- firearms-related suicide: E955.0 to E955.4
- firearms-related homicide: E965.0 to E965.4
- firearms-related, unintentional: E922.0 to E922.9
- firearms-related, intent undetermined: E985.0 to E985.4
- firearms-related legal intervention: E970

The ICD-10 codes are:

- firearms-related suicide: X72 to X74
- firearms-related homicide: X93 to X95
- firearms-related, unintentional: W32 to W34
- firearms-related, intent undetermined: Y22 to Y24
- firearms-related legal intervention: Y35.0

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Table A

Number and rate of firearms-related deaths, by sex, Canada, 1979 to 2002

	Both sexes		Males		Females	
	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population
1979	1,416	5.9	1,274	10.6	142	1.2
1980	1,421	5.8	1,273	10.4	148	1.2
1981	1,473	5.9	1,311	10.6	162	1.3
1982	1,528	6.1	1,350	10.8	178	1.4
1983	1,517	6.0	1,371	10.9	146	1.1
1984	1,372	5.4	1,236	9.7	136	1.1
1985	1,320	5.1	1,189	9.3	131	1.0
1986	1,435	5.5	1,273	9.8	162	1.2
1987	1,423	5.4	1,273	9.7	150	1.1
1988	1,314	4.9	1,197	9.0	117	0.9
1989	1,364	5.0	1,207	8.9	157	1.1
1990	1,323	4.8	1,201	8.7	122	0.9
1991	1,443	5.1	1,290	9.3	153	1.1
1992	1,352	4.7	1,230	8.7	122	0.8
1993	1,286	4.4	1,180	8.2	106	0.7
1994	1,199	4.1	1,098	7.6	101	0.7
1995	1,125	3.8	1,028	7.0	97	0.6
1996	1,131	3.8	1,014	6.9	117	0.8
1997	1,037	3.5	945	6.4	92	0.6
1998	996	3.3	911	6.1	85	0.6
1999	1,006	3.3	926	6.1	80	0.5
2000	878	2.9	811	5.3	67	0.4
2001	842	2.7	777	5.0	65	0.4
2002	816	2.6	767	4.9	49	0.3

Data source: Canadian Mortality Database

Table B

Annual number and rate of firearms-related deaths, by manner/intent and age group, 1979, 1990, and 2002

	Suicide		Homicide		Unintentional		Undetermined	
	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population
1979	1,085	4.5	183	0.8	71	0.3	62	0.3
0-14	3	0.1	6	0.1	16	0.3	1	0.0
15-24	362	7.5	52	1.1	27	0.6	14	0.3
25-44	398	5.7	82	1.2	13	0.2	31	0.4
45-64	255	5.6	38	0.8	13	0.3	14	0.3
65+	67	3.0	5	0.2	2	0.1	2	0.1
1990	1,053	3.8	182	0.7	66	0.2	13	0.0
0-14	10	0.2	6	0.1	8	0.1	1	0.0
15-24	220	5.4	35	0.9	18	0.4	3	0.1
25-44	462	4.9	95	1.0	17	0.2	6	0.1
45-64	227	4.3	33	0.6	19	0.4	1	0.0
65+	134	4.3	13	0.4	4	0.1	2	0.1
2002	633	2.0	137	0.4	31	0.1	11	0.0
0-14	4	0.1	7	0.1	3	0.1	0	0.0
15-24	87	2.1	38	0.9	3	0.1	4	0.1
25-44	173	1.8	59	0.6	15	0.2	3	0.0
45-64	247	3.2	27	0.4	7	0.1	2	0.0
65+	122	3.1	6	0.2	3	0.1	2	0.1

Data source: Canadian Mortality Database
Note: Legal intervention involving firearm discharge accounted for 15 deaths in 1979, 9 deaths in 1990, and 4 deaths in 2002.

Table C

Average annual number and rate of firearms-related deaths, by manner/intent and province/territory, 2000-2002

	Total		Homicide		Suicide		Unintentional		Undetermined	
	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population	Number	Deaths per 100,000 population
Canada	844.7†	2.7	147.0†	0.5	656.3†	2.1	26.3†	0.1	10.0†	0.0
Newfoundland and Labrador	12.0	2.2	1.3	0.2	8.7	1.6	1.7	0.3	0.0	0.0
Prince Edward Island	4.3	3.1	0.0	0.0	4.3	3.1	0.0	0.0	0.0	0.0
Nova Scotia	30.0	3.2	3.3	0.4	26.0	2.8	0.3	0.0	0.0	0.0
New Brunswick	35.3	4.7	3.3	0.4	31.0	4.1	0.7	0.1	0.3	0.0
Québec	253.7	3.4	44.3	0.6	198.0	2.7	7.7	0.1	3.0	0.0
Ontario	198.7	1.7	50.0	0.4	139.0	1.2	2.3	0.0	5.3	0.0
Manitoba	30.7	2.7	2.3	0.2	23.3	2.0	4.3	0.4	0.3	0.0
Saskatchewan	39.0	3.8	3.7	0.4	33.0	3.2	1.7	0.2	0.3	0.0
Alberta	119.7	3.9	17.3	0.6	99.3	3.2	1.7	0.1	0.3	0.0
British Columbia	108.3	2.6	21.0	0.5	81.3	2.0	5.3	0.1	0.3	0.0
Yukon	3.0	9.9	0.0	0.0	3.0	9.9	0.0	0.0	0.0	0.0
Northwest Territories	4.7	11.3	0.3	0.8	3.7	8.9	0.7	1.6	0.0	0.0
Nunavut	5.3	17.8	0.0	0.0	5.0	17.8	0.0	0.0	0.0	0.0

Data source: Canadian Mortality Database
† Because of rounding, detail may not add to total.


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CONSULTATIONS WITH DOCTORS AND NURSES

by Gisèle Carrière

The Canada Health Act guarantees universal access to health care. However, the type of services that Canadians actually use varies. Changes to health care delivery have resulted in shifts in consultation venues for health care professionals—especially nurses.

Most have family doctor or GP

In 2003, an estimated 86% of Canadians aged 12 and older—about 23 million people—reported that they had a "regular" medical doctor. Even if they did not, just over three-quarters of people these ages (77%) said they had consulted a family physician or a general practitioner (GP) at least once in the past year. As well, 11% reported having consulted a nurse.

Predictably, older Canadians were more likely than younger people to have seen or talked to a family physician or GP. By contrast, having had at least one consultation with a nurse was more likely in early adulthood.

At nearly all ages, the proportion of females who consulted family physicians/GPs or nurses at least once was greater than that for males. Nurse visits among seniors were the exception. While women aged 65 or older were still more likely than their male counterparts to have sought care from those types of physicians, the proportion of seniors who consulted a nurse at least once did not differ by sex (data not shown).

Residents of Nunavut, the Northwest Territories and Québec were less likely than Canadians overall to have consulted a family physician/GP. Lower proportions of people in the Northwest Territories and Québec had a regular medical doctor, compared with Canadians overall (data not shown). But larger proportions of people in the territories and Québec had consulted a nurse at least once, which may reflect a greater reliance on nurses for primary health care.

Percentage of population aged 12 or older who consulted a family physician, general practitioner or nurse at least once in past 12 months

	Consulted family physician† or general practitioner		Consulted nurse	
	'000	%	'000	%
Canada	20,433	77	2,881	11
Males	9,331	72*	1,141	9*
Females‡	11,102	83	1,740	13
Total, aged 12 or older‡				
12-19	2,292	70*	383	12*
20-34	4,541	72*	879	14*
35-44	3,992	76*	502	9*
45-64	6,295	80*	699	9*
65+	3,312	88*	419	11
Total, education‡				
Less than secondary graduation	5,215	76*	748	11
Secondary graduation	3,582	76*	456	10*
Some postsecondary	1,540	77	234	12
Postsecondary graduation	9,676	79*	1,393	11*
Residence				
Urban	16,680	78*	2,290	11*
Rural‡	3,753	75	591	12

Data source: 2003 Canadian Community Health Survey
† Includes consultations with pediatricians for respondents younger than 18.
‡ Reference group
** Significantly different from estimate for reference group (p < 0.05)*

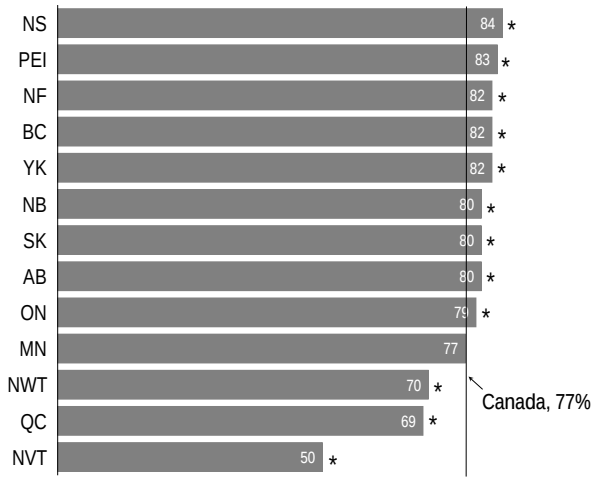
Income differences

The likelihood of consulting a family physician/GP varied little according to household income, although reporting at least one consultation with these physicians was slightly more common for people in the highest income category and slightly less common for those in the lowest one (Table A). Similarly, post-secondary graduates were more likely to have consulted a physician, compared with Canadians overall.

These findings were somewhat surprising, given the well-known relationship between low socio-

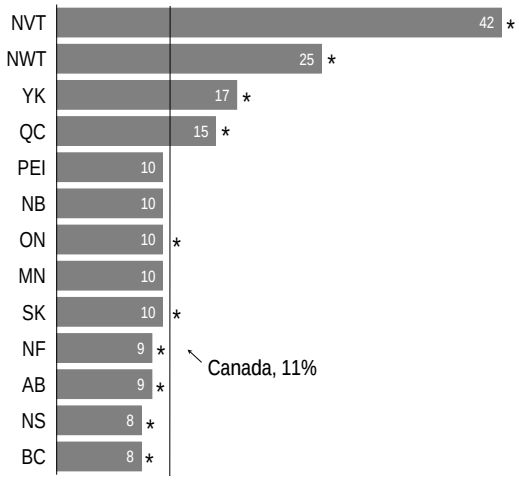
economic status and poor health. But the data reflect only the proportion of people who consulted a doctor at least once during the previous year, not the volume or frequency of contacts. Once-a-year visits to physicians for check-ups and preventive screening probably contributed to the modestly higher proportions of people with higher levels of income and education who had consulted a doctor. By contrast, contacts with a nurse were slightly more likely among people in lower-income households than among those with greater means.

Percentage of population aged 12 or older who consulted a family physician† or general practitioner at least once in past 12 months



Data source: 2003 Canadian Community Health Survey
† Includes consultations with pediatricians for respondents younger than 18.
** Signficantly different from estimate for Canada (p < 0.05)*

Percentage of population aged 12 or older who consulted a nurse at least once in past 12 months



Data source: 2003 Canadian Community Health Survey
** Signficantly different from estimate for Canada (p < 0.05)*

Percentage of population aged 12 or older who consulted a nurse in past 12 months, by most common location of most recent consultation

	2000/01		2003	
		%		%
Canada	Home	2	Telephone	2*
Newfoundland and Labrador	Home	2	Hospital outpatient	2
Prince Edward Island	Doctor's office	2	Doctor's office	3
Nova Scotia	Home	2	Hospital outpatient	2*
New Brunswick	Home	2	Telephone	2
Québec	Community Health Centre	4	Community Health Centre	5
Ontario	Home	2	Telephone	3*
Manitoba	Home	2	Telephone	2[E]
Saskatchewan	Home	2	Home	2
Alberta	Community Health Centre	2	Telephone	2*
British Columbia	Home	1	Home	1
Yukon	Community Health Centre	10	Community Health Centre	7[E]
Northwest Territories	Community Health Centre	19	Community Health Centre	10*[E]
Nunavut	Community Health Centre	38	Community Health Centre	30[E]

Data source: 2000/01 and 2003 Canadian Community Health Survey
** Significantly different from estimate for the same location in 2000/01 (p < 0.05)*
E Coefficient of variation 16.6% to 33.3% (interpret with caution)

Telephone help-lines

To some extent, the settings in which people receive care depend on where they live. In Québec, for example, nurses and other professionals working in community clinics provide first-line health care services. Residents of the North receive much of their basic health care in nursing stations. And in some jurisdictions, "telephone triage" services are available 24 hours a day, 7 days a week so that people can speak to a nurse and receive advice over the telephone.[1]

Overall, 11% of Canadians aged 12 or older (nearly 2.9 million people) consulted a nurse at least once in 2003. Although contacts with nurses occurred in a variety of settings, respondents were most likely to say that the most recent consultation took place over the telephone. Just two years earlier, according to the 2001 CCHS, a client's home had been the most likely place for the most recent consultation with a nurse. This shift to telephone nursing consultations essentially reflects the situation in Ontario and Alberta, where telephone help-lines have been implemented to facilitate access.

In Nova Scotia, the most frequently reported location of the most recent nursing contact shifted from home in 2001 to hospital outpatient departments in 2003. In the Northwest Territories, the proportion consulting nurses in a community health centre dropped by almost half, but this venue remained the most commonly reported location for the most recent nurse consultation.

The Questions

Information about *consultations with family doctors/general practitioners* is based on responses to the following question: "In the past 12 months, how many times have you seen, or talked on the telephone about your physical, emotional or mental health with a family doctor [includes pediatricians for respondents aged less than 18] or general practitioner?" Virtually the same question was asked about *consultations with nurses*. Respondents who indicated doctor or nurse consultations were asked where the most recent contact had taken place.

Data source

Information about consultations with family physicians (including pediatricians), general practitioners, and nurses is from the 2003 Canadian Community Health Survey (CCHS).[2] Information about consultations with nurses was also obtained from the 2000/01 CCHS. The CCHS is a general health survey that covers the household population 12 or older. It does not include residents of Indian reserves, Canadian Forces bases, and some remote areas. The overall response rate was 84.7% in 2000/01 and 80.6% in 2003. The respective sample sizes were 131,535 and 135,573.

Variance on estimates, and on differences between estimates, was calculated using the bootstrap technique, which accounts for the complex sampling design of the surveys.[3,4]

The data were weighted to estimate the number and percentage of Canadians who had contact with doctors or nurses at least once in the previous 12 months. The estimates do not represent the total number of visits that occurred.

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Table A

Percentage of population who consulted a family physician, general practitioner or nurse at least once in past 12 months, by household income, household population aged 12 or older, Canada, 2003

	Consulted family physician† or general practitioner		Consulted nurse	
	'000	%	'000	%
Canada‡	17,066	77	2,427	11
Lowest	470	75*	79	13*
Lower-middle	1,049	77	182	13*
Middle	3,360	77	482	11
Upper-middle	5,841	77	820	11
Highest	6,346	78*	864	11

Data source: 2003 Canadian Community Health Survey
† Includes consultations with pediatricians for respondents younger than 18.
‡ Reference group
** Significantly different from estimate for Canada ($p < 0.05$)*

HEARING PROBLEMS AMONG SENIORS

by Wayne J. Millar

According to national data from the 2003 Canadian Community Health Survey (CCHS), about 3% of the Canadian household population aged 12 or older had some type of difficulty with their hearing.

Because hearing problems tend to increase with age, seniors are disproportionately affected. Although seniors accounted for just 14% of the 12-or-older household population, they represented 55% of people with hearing problems (data not shown). About 11% of the population aged 65 or older, an estimated 402,000 seniors, had a hearing problem. At ages 65 to 69, 5% had a hearing problem; by age 80 or older, the figure was 23%.

Percentage of seniors reporting hearing problems—by age and sex

	Total	Corrected	Uncorrected
	%	%	%
All seniors	11	7	3
65-69	5†	4†	1†E
70-74	8†	5†	3E
75-79	11	8	3E
80+	23†	16†	7†
Men	12*	9*	4
65-69	6†	5†E	2†E
70-74	11	7	5E
75-79	13	10E	3E
80+	29†	22†	7†E
Women	9*	6*	3
65-69	4†	3†E	F
70-74	6†	4†E	2E
75-79	9	7E	3E
80+	20*	13†	7†E

Data source: 2003 Canadian Community Health Survey
Note: Subtotals may not sum to total because of rounding.
** Significantly different from estimate for all seniors ($p < 0.05$)*
† Significantly different from estimate for totals within sex/age group ($p < 0.05$)
E Coefficient of variation 16.6 to 33.3% (interpret with caution)
F Coefficient of variation greater than 33.3% (suppressed because of extreme sampling variability)

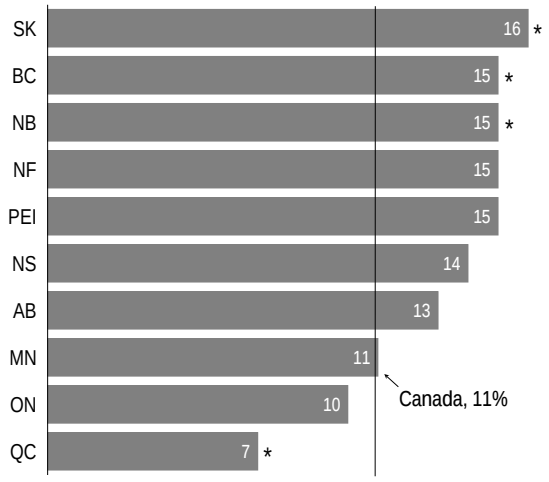
More common among men

In 2003, in almost every age group, the proportion of men who had difficulty hearing was higher than that for women.

The proportion of seniors with hearing problems generally did not vary with household income or education (data not shown). These results suggest that age-related factors play a more important role in hearing loss than do socio-economic ones.

In Québec, the proportion of seniors with hearing problems (7%) was significantly lower than the national average of 11%; in Saskatchewan (16%), British Columbia (15%) and New Brunswick (15%), it was significantly higher.

Percentage of seniors reporting hearing problems—by province



Data source: 2003 Canadian Community Health Survey
** Signficantly different from estimate for all seniors ($p < 0.05$)*

Corrected, uncorrected

Most seniors with hearing problems reported that the difficulties had been corrected. However, 3% reported uncorrected problems; that is, those not yet corrected or not amenable to correction. Overall and in each age group, the prevalence of uncorrected hearing problems was higher among men than women. As might be expected, the proportion of uncorrected problems was lower in the 65-to-69 age group and higher for seniors aged 80 or older.

Compared with the national rate, the prevalence of uncorrected hearing problems was significantly higher among residents of New Brunswick (data not shown).

Consulting physicians

Annual medical examinations provide an important opportunity to monitor

hearing function, particularly for seniors. Based on the high prevalence of hearing problems among seniors and the proven effectiveness of intervention, current recommendations favour screening for hearing impairment.[1] Therefore, regular physician consultations should increase the likelihood that hearing function would be assessed. While information specifically about hearing assessments or testing is not available from the CCHS, respondents were asked about consultations with physicians.

Small decline in hearing problems

From 1994/95 to 2003, the proportion of seniors with hearing problems declined from 18% to 11%. The decrease was evident in all senior age groups, overall and for both sexes. In 1994/95, 15% of women reported hearing problems, compared with 9% in 2003. The corresponding figures for men were 22% and 13%. Lower rates of reported hearing loss could be attributable to a real decline in prevalence, or to improvements in the quality of assistive devices.

Percentage of seniors with hearing problems, by sex and age group—trends

	1994/95 NPHS	1996/97 NPHS	1998/99 NPHS	2000/01 CCHS	2003 CCHS
All seniors	18	14	14	14	11*
65-69	11	8	6	8	5*
70-74	13	10	13	12	8*
75-79	21	15	15	15	11*
80+	33	29	28	27	23*
Men	22	18	18	18	13*
65-69	14	9	8	11	6*
70-74	17	15	18	17	11*
75-79	25	23	20	21	13
80+	38	32	30	31	29
Women	15	12	12	11	9*
65-69	9	7	5	5	4*
70-74	10	7	8	9	6*
75-79	17	10	11	10	9*
80+	29	27	27	24	20*

Data sources: 1994/95, 1996/97, 1998/99 National Population Health Survey, cross-sectional sample, Health file; 2001/02 and 2003 Canadian Community Health Survey

** Significantly different from estimate for 1994/95 ($p < 0.05$)*

About 88% of seniors with a hearing problem had consulted a physician in the past year. There was no difference in the consultation rate by whether the problem had been corrected, or by sex. Among both men and women, consultation rates were highest in the oldest age group (data not shown).

The Questions

The estimates of *hearing problems among seniors* are based on data from questions in the Canadian Community Health Survey (CCHS).

- "Are you usually able to hear what is said in a group conversation with at least three other people *without a hearing aid*?"

If the answer was "no," the respondent was asked:

- "Are you usually able to hear what is being said in a group conversation with at least three other people *with a hearing aid*?

Respondents who said "no" were then asked it they were "able to hear at all." Those who said "yes" were asked if they could "hear what is being said in a conversation with one other person in a quiet room *without a hearing aid."* If they could not, they were asked about their ability to do so *with a hearing aid*.

Corrected hearing problems are: problem hearing in group context, corrected; problem hearing in group and individual contexts, corrected; and problem hearing in group and individual context, individual context corrected. *Uncorrected hearing problems* represent problems hearing in group context, not corrected. *Cannot hear* was a separate category. These groupings are not mutually exclusive. For example, the "corrected" category includes individuals who had difficulty hearing in both group and individual contexts, but the "correction" applies only to the problems in the individual context.

Consultations with physicians was based on the following question: "In the past 12 months, how many times have you seen or talked on the telephone about your physical, emotional or mental health with a family doctor or general practitioner?"

Self-perceived health status was based on seniors' responses to: "In general, would you say your health is excellent, very good, fair or poor?"

Self-perceived mental health was assessed with replies to: "In general would you say your mental health is excellent, very good, good, fair or poor?"

To evaluate their *emotional state,* respondents were asked the following question: "Would you describe yourself as being usually happy and interested in life? somewhat unhappy? unhappy with little interest in life? so unhappy that life is not worthwhile?" For this analysis, seniors in the last three categories were considered "unhappy."

Emotional/Mental health

Seniors with hearing problems were no more or less likely than those without such problems to have negative perceptions of their health. However, the self-perceived emotional state of seniors with hearing problems differed significantly from that of seniors without such problems. Among seniors with a hearing problem, 6% said they felt sad versus 3% for those without hearing problems (age-adjusted). Self-perceived mental health was also related to the presence of hearing problems. About 9% of seniors with a hearing impairment reported their mental health as fair/poor versus 5% of those without. At the opposite end of the mental health continuum, 53% of seniors with a hearing disability said their mental health was excellent/very good, compared with 63% of those without a hearing disability. These findings are consistent with other studies reporting that the quality of life of community-dwelling elderly is significantly associated with decline in sensory function.[2-5]

Hearing disabilities

Statistics Canada's Participation and Activity Limitation Survey (PALS) is a post-censal survey that collected information about people whose everyday activities were limited because of a health-related condition or problem. PALS defined a hearing disability as "difficulty hearing what is being said in a conversation with one other person, in a conversation with three or more persons, or in a telephone conversation."[6] Because the definitions are not the same, PALS estimates of "hearing disabilities" differ from estimates of "hearing problems" based on data from the Canadian Community Health Survey. According to PALS, 16% of the population aged 65 or older had a disability related to hearing in 2001. In the 2003 CCHS, 11% of people aged 65 or older said they had a hearing problem. The three-year difference in the survey dates may also contribute to the different estimates.

Aging and hearing loss

A gradual decline in hearing is often regarded as an inevitable consequence of normal aging. But hearing loss is insidious: it may develop slowly and gradually so that the individual may not even be aware of any impairment, or the consequences of the impairment.[7] Therefore, survey estimates of hearing loss based on self-reports are likely lower than estimates that more objective measurements of hearing function would yield. As well, many seniors are reluctant to admit their hearing may be impaired.[8] Consequently, the estimates of hearing problems among seniors in this analysis are likely conservative indicators of the true prevalence.

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Data sources

The Canadian Community Health Survey (CCHS) is a general survey that covers the household population aged 12 or older.[9] It does not include residents of Indian reserves, Canadian Forces bases, and some remote areas. Data for cycle 2.1 were collected between January and December 2003. Supplemental estimates of hearing loss were obtained from the 2000/01 CCHS and the 1994/95, 1996/97 and 1998/99 National Population Health Survey (NPHS).

Sample characteristics, household population aged 65 or older, selected surveys

Survey	Response rate %	Sample
2003 CCHS	80.6	7,653
2000/01 CCHS	84.7	24,134
1998/99 NPHS	88.2	2,851
1996/97 NPHS	79.0	13,363
1994/95 NPHS	88.7	3,143

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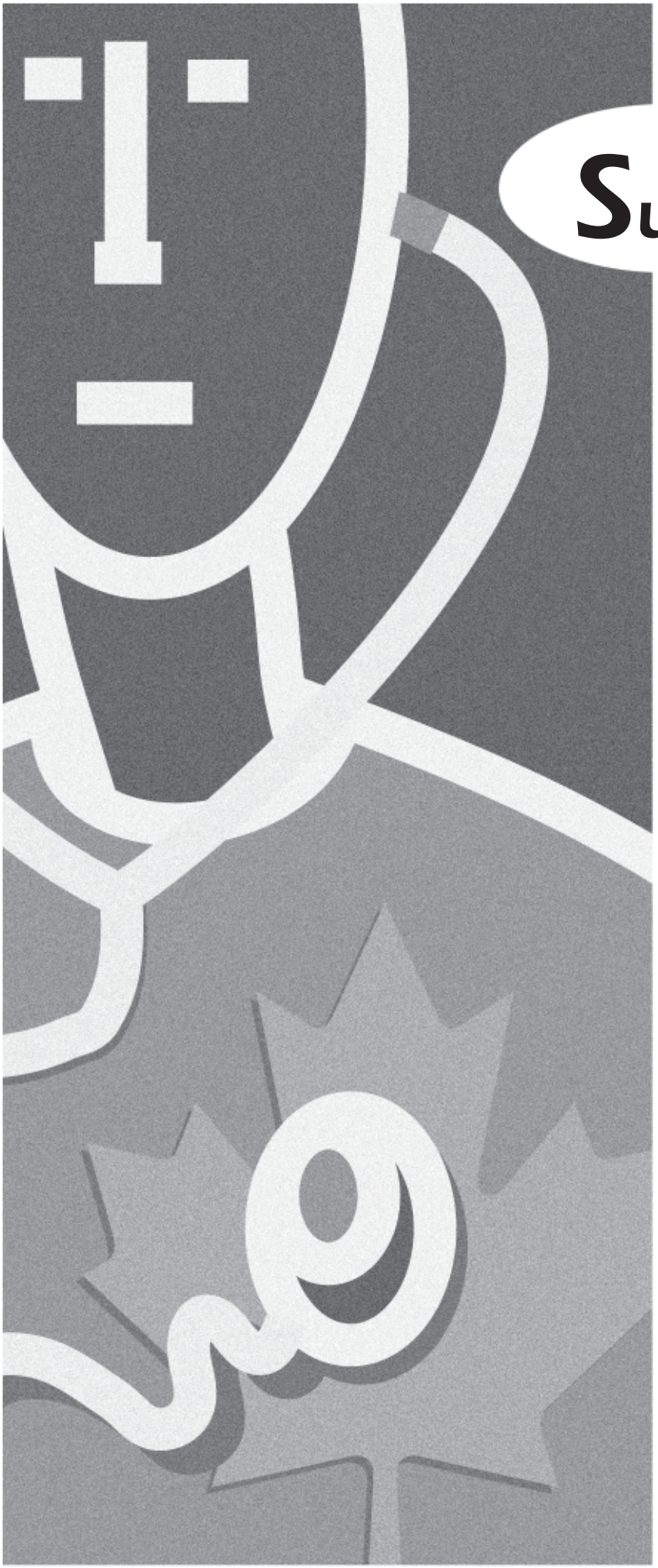

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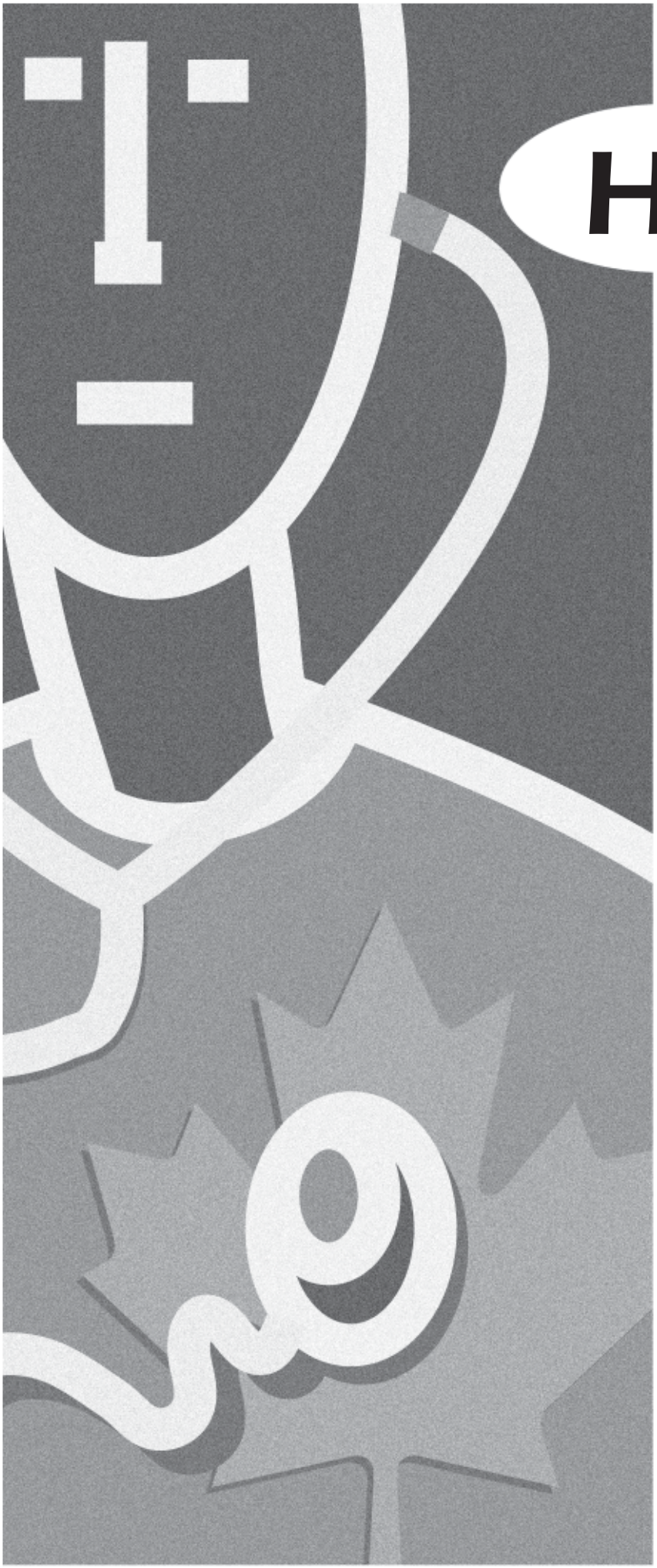

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