Unhealthy behaviours among Canadian adolescents: prevalence, trends and correlates

T. M. Gadalla, PhD

This article has been peer reviewed.

Abstract

Introduction: This study examines (1) time trends in the prevalence of selected unhealthy behaviours among adolescents aged 12 to 17 years, (2) the most commonly adopted combinations of unhealthy behaviours, and (3) socio-economic and sociodemographic correlates of unhealthy behaviours among adolescents.

Methods: A secondary analysis used data collected from 13 198 Canadian Community Health Survey (CCHS) respondents in 2000/2001 and 11 050 CCHS respondents in 2007/2008.

Results: Although the proportion of adolescents consuming a healthy diet increased over the study period, about 50% are still consuming insufficient amounts of fruit and vegetables. In both cycles over one-third of adolescents aged 15 to 17 years reported drinking alcohol regularly. Income level, education level, sex, and language spoken at home were significantly associated with the odds of engaging in unhealthy behaviours among those aged 12 to 14 years, while income level was no longer associated with the odds of engaging in unhealthy behaviours among those aged 15 to 17 years. For both age groups, a language other than French or English spoken in the home was associated with a low risk of unhealthy behaviours.

Conclusion: There was a general decrease in unhealthy behaviours among younger adolescents aged 12 to 14 years.

Keywords: *adolescents' health, alcohol, smoking, healthy eating, body weight, physical activity*

Introduction

Unhealthy behaviours in adolescence, such as smoking, physical inactivity, unhealthy eating (for example, consuming less fruit and vegetables than recommended) and alcohol drinking, contribute to chronic diseases in adulthood.[1,2,3] Young adults who reported having their first alcoholic drink at the age of 11 to 14 years experienced an increased risk of alcohol-related diseases,[1] such as certain cancers and heart and vascular disease,[4] as well as an increased risk of adverse impact on brain development.[4,5] Chronic health conditions, in turn, have significant adverse effects on quality of life and productivity.[3,6]

Physical inactivity and unhealthy eating lead to overweight and obesity, risk factors for a large number of chronic health complications such as cardiovascular disease, hypertension, type 2 diabetes, stroke, sleep apnea and certain types of cancer as well as complications in pregnancy and during surgery.[7] Obesity has also been implicated as a risk factor for functional limitations and poor health-related quality of life.[8,9]

In studies using national samples of high school students in the United States, almost one-quarter were overweight[10,11] and 13.6% obese.[11] More than three-quarters (78.4%) of a U.S. national sample of young adults aged 18 to 24 years consumed less than five fruits and vegetables per day, and 43.2% reported insufficient or no physical activity.[12] Similar rates have been observed in Canadian youth: based on national data of Canadian children aged 7 to 13 years, Tremblay and Willms reported an increase of 0.1 kg/m^2 per year in body mass index (BMI) between 1981 and 1996.[13] These authors also reported a 28.8% and 23.6% prevalence of overweight in boys and girls, respectively.[13]

Seo et al. reported that the prevalence of smoking among high school students increased from 21.9% in 2003 to 23.0% in 2005.[11] Pisetsky et al. found similar rates of current smoking among adolescents.[14] About one-third (34.3%) of students in grades 7 to 12 living in the Atlantic provinces in Canada reported smoking cigarettes.[15]

Seo et al. also reported a detrimental correlation between smoking and unhealthy eating.[11] Smoking among U.S. high school students was associated with being overweight, and this association became stronger between 1999 and 2005.[11]

Pisetsky et al. found that 22.0% of female and 27.7% of male high school students binge drink, that is, consume 5 or more alcoholic drinks in one sitting at least once a month.[14] In a sample of young adults aged 18 to 24 years living in the U.S., 28.9% reported being current smokers

Author references:

Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, Ontario, Canada

Correspondence: Tahany M. Gadalla, Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, ON M5S 1V4; Tel.: (416) 946-0623; Fax: (416) 978-7072; Email: tahany.gadalla@utoronto.ca

and 30.1% reported binge drinking.[12] A national survey of 4296 Canadian adolescents found that 29% of those aged 14 to 15 years reported drinking to intoxication.[16] Over half (53.6%) of students in grades 7 to 12 living in the Atlantic provinces of Canada reported using alcohol.[15]

Differences exist in the prevalence of health-risk behaviours by socio-economic status, sex and ethnicity. Wardle et al. found that adolescents from more deprived neighbourhoods were more likely to have tried smoking, to eat a high fat diet and to be overweight; these differences persisted after controlling for ethnicity.[2] On the other hand, Tremblay and Willms found that levels of physical activity and sedentary behaviour partially accounted for the association between socio-economic status and overweight/obesity in Canadian children aged 7 to 11 years.[17] In a recent study of Californian adolescents aged 12 to 17 years, the prevalence of obesity increased significantly between 2001 and 2007 among lower-income adolescents but not among higher-income adolescents.[18]

A number of studies have shown that, compared to adolescent boys, adolescent girls are generally more fixated on their body weight and more engaged in weight control methods, some of which are unhealthy, for example, cigarette smoking and using diet pills or laxatives.[10,19-21] Garry et al. also reported a strong association between the use of diet pills and vomiting/laxative-use with alcohol use and cigarette smoking in middle school students.[20] Allison et al. found that daily smoking decreased as education level increased, but that this decrease was not associated with income level.[22] More recently, Kestila et al. examined the relationship between childhood social circumstances and overweight in young adults aged 18 to 29 years.[23] The researchers found that being overweight was associated with low parental education and irregular parental employment in women, but not in men. Women who lived in rural municipalities in childhood were more likely to be obese than those from semi-urban or urban municipalities.[23]

Knowing the types and frequency of adolescents' unhealthy behaviours as well as the rate of their engagement is essential for planning prevention, intervention and outreach programs aimed at increasing the health of Canadians. Policy makers would also benefit from an examination of the time trends (years) of the unhealthy behaviours as well as the identification of groups of youth at high risk of engaging in such behaviours, information that is currently lacking. This study is an attempt to fill these gaps in knowledge. Specifically, the aim of this research is to (1) examine trends in the prevalence of obesity or overweight and unhealthy behaviours such as low physical activity, unhealthy eating (e.g. the consumption of less fruit and vegetables than recommended for this age group) and alcohol drinking in a nationally representative sample of Canadian adolescents aged 12 to 17 years between 2000/2001 and 2007/2008; (2) investigate the most common combinations of unhealthy behaviours adopted by adolescents by sex; and (3) identify the sociodemographic and economic attributes associated with engaging in unhealthy behaviours in younger as well as older adolescents.

Methods

Sample

This research used data collected in two cycles of the Canadian Community Health Survey (CCHS) under the authority of the *Canadian Federal Statistics Act*.[24] This cross-sectional survey, conducted every two years, uses a multistage stratified cluster probability sampling in which a dwelling is the final sampling unit. The survey sample was stratified by province/territory and urban versus rural regions within each province/territory. Sampling was designed to represent 98% of the Canadian population aged 12 years or more who lived in private dwellings in the ten provinces and the three territories. In both cycles, approximately half of the respondents were randomly selected to be interviewed face-to-face using the computer-assisted personal interviewing method, and half were interviewed by telephone using the computer-assisted telephone interviewing method.[24,25] Introductory letters mailed to selected respondents assured them of the confidentiality laws governing the release and/or publication of collected data and of the voluntary nature of participation. Interviewers obtained verbal permission from parents/guardians to interview youth aged between 12 to 15 years and explained the purpose of collecting the data, the subjects to be covered and the need to respect a child's right to privacy and confidentiality. If a youth could not be privately interviewed either in person or over the phone, the interview was coded as a refusal. More details about the survey design are published elsewhere.[24,25] There were 13 198 respondents aged 12 to 17 years in the 2000/2001 survey and 11 050 in the 2007/2008 survey.

Measures

Alcohol drinking was measured using two variables: frequency of drinking and binge drinking. Frequency of drinking was based on the respondent's drinking habits in the 12 months before the survey (regular, occasional, did not drink). A regular drinker drank alcohol once a month or more often during the year before the survey, and an occasional drinker drank alcohol less frequently. Binge drinking was defined as consuming five or more alcohol drinks in one sitting at least once a month.

Cigarette smoking was measured using one variable, frequency of smoking. Respondents were asked: "At the present time, do you smoke cigarettes daily, occasionally or not at all?" Responses were categorized as "daily smoker," "occasional smoker" and "non-smoker."

BMI classification was based on the age- and sex-specific BMI cut-off points as defined by Cole et al. for 12 to 18 year olds.[26] These, in turn, were based on pooled international data from Brazil, Great Britain, Hong Kong, Netherlands, Singapore and the U.S.[26] The authors used heights and weights of over 192 000 individuals to develop age- and sex-specific cut-off points for BMI categories for 12- to 18-year-olds. Cut-off points were specific for each sex and year of age, and ranged between 21.22 kg/m^2 and 30.0 kg/m^2 for boys and from 21.68 kg/m^2 and 30.0 kg/m^2 for girls. This variable classifies adolescents (except girls aged 15 to 17 years who were either pregnant or did not answer whether they were pregnant or not) as "obese," "overweight" or "neither obese nor overweight."

Other variables of health used in the analysis included daily consumption of fruit and vegetables (less than five servings versus five or more servings) as a marker for an unhealthy diet, and perceived general health (excellent/very good, good and fair/poor). Data on self-perceived stress were collected only from respondents 15 years or more in response to the following question: "Thinking about the amount of stress in your life, would you say that most days are not at all stressful / not very stressful / a bit stressful / quite a bit stressful / extremely stressful?"

Physical activity was measured using two variables, level of physical activity and time spent in sedentary activities. Level of physical activity categorizes respondents as being "active," for a total energy expenditure (EE) in their transportation and leisure activities of 3.0 kcal/kg/day or greater, "moderately active" for an EE of 1.5 kcal/kg/day or greater, but less than 3.0 kcal/kg/day, or "inactive" for an EE of less than 1.5 kcal/kg/day. Respondents' energy expenditure was calculated using the frequency and time per session of each physical activity and its metabolic energy cost (MET). For example, an activity of 4 METs requires 4 times the amount of energy as compared to when the body is at rest. The amount of metabolic energy used in a 15-minute session of each leisure activity (MET) was calculated and multiplied by the number of sessions to get the total energy expenditure (EE) corresponding to each activity. Survey respondents were not asked to specify the intensity level of their activities; therefore, the MET values calculated here correspond to the low intensity value of each activity. This approach was adopted because people tend to overestimate the intensity, frequency and duration of their activities.[24]

The total number of hours spent in sedentary activities in a typical week in the three months before the survey was also estimated. Sedentary activities included using a computer (including playing computer games and surfing the Internet), playing video games, watching television or videos and reading. The time spent at school or work was not included. Respondents' sedentary activities were then classified into four categories: less than 15 hours/week, 15 to 29 hours/week, 30 to 44 hours/week and 45 or more hours/week.

Sociodemographic characteristics used in this research included sex, age group (12–14 years and 15–17 years), language spoken at home (English/French versus other), place of birth (Canada versus other), highest level of education in the household (less than secondary school degree, secondary school graduate, some post-secondary education, post-secondary graduate), and income level. However, data on income level were reported differently in the two cycles of CCHS. In the 2000/2001 cycle, income adequacy was grouped into four levels, while in the 2007/2008 cycle it was grouped into three.[24] Consequently, a direct comparison of this variable could not be carried out.

Data analyses

Age-specific rates of engagement in health risk behaviours for the years 2000/2001 and 2007/2008 were calculated and compared, and used chi-square (χ^2) tests to compare the prevalence of unhealthy behaviours in the two cycles. χ^2 tests were also used to assess the bivariate relationships between unhealthy behaviours and various sociodemographic and economic attributes.

Unhealthy behaviours with more than two levels were recoded as yes/no variables. For example, "physically inactive" was coded as yes while "active" and "moderately active" were coded as no, "daily" and "occasional" cigarette smoking were coded as yes while "not at all" was coded as no, "regular" and "occasional" alcohol drinking were coded as yes and "non-drinker" as no. Data were then aggregated to show the most common combinations of unhealthy behaviours adopted by male and female adolescents separately.

Logistic regression models were used to examine the effects of sociodemographic and economic attributes associated with engaging in unhealthy behaviours in younger as well as older adolescents. Only those variables that were significantly associated with engagement in unhealthy behaviours in the bivariate tests were included in the multivariate analysis. Sampling weights were rescaled and used in all analyses. Rescaling the weights to have an average of one has two advantages. First, it takes into account the unequal probabilities of selection of survey respondents and adjusts the sample results to the demographic composition of the Canadian population so that the results represent the population of Canada and not just the sample itself. Second, it keeps the total sample size unchanged to guard against inflating the sample size for hypothesis testing.[24,25]

Results

Table 1 shows the descriptive statistics of all the variables used in the analysis. The most notable change over the study period was a 9 percentile point increase in the proportion of adolescents consuming five or more fruits/vegetables per day (12–14 years: $\chi^2 = 729.33$, $p < .001$; 15–17 years: $\chi^2 = 65.90$, $p < .001$). There was also a marked reduction in the prevalence of cigarette smoking for both age groups (12–14 years: $\chi^2 = 96.79$, $p < .001$; 15–17 years: $\chi^2 = 120.53$, $p < .001$).

Although the data showed slight improvement in the proportion of physically active adolescents, the number of hours spent in sedentary activities showed a bigger increase; the proportion of adolescents who spent more than 45 hours/week in sedentary activities increased from 6.1% to 8.3% among younger adolescents (12–14 years: $\chi^2 = 42.69$, $p < .001$) and from 3.8% to 9.0% among older adolescents (15–17 years: $\chi^2 = 170.00$, $p < .001$). There was also a significant improvement in BMI distribution for the younger adolescents (12–14 years: $\chi^2 = 23.43$, $p < .001$), but not for the older ones. Similarly, the prevalence of binge drinking improved significantly for the younger group (12–14 years: $\chi^2 = 13.30$, $p < .001$), but not for the older one.

Table 2 shows the number of unhealthy behaviours adopted by adolescents and their distribution based on age and sex. The proportion of younger adolescents (12–14 years) who had not adopted any unhealthy behaviours increased considerably (males: 25.2% to 36.4%; females: 26.7% to 38.5%) between 2000/2001 and 2007/2008. Among older

TABLE 1
Characteristics and descriptive statistics of adolescent respondents (aged 12–17 years) in the 2000/2001 and 2007/2008 Canadian Community Health Survey samples

	CCHS respondents, n (%)			
	12–14 years		15–17 years	
	2000/2001 (n = 6251)	2007/2008 (n = 5574)	2000/2001 (n = 6947)	2007/2008 (n = 5476)
Female	2993 (47.9)	2664 (48.7)	3459 (49.8)	2705 (49.4)
Income[a]				
Highest 30%	–	1684 (37.0)	–	1267 (32.1)
Middle 40%	–	1839 (40.4)	–	1741 (44.1)
Lowest 30%	–	1034 (22.6)	–	943 (23.0)
Language spoken at home				
English/French	–	5057 (90.7)	–	2914 (89.7)
Other	–	517 (9.3)	–	561 (10.3)
Country of birth				
Canada	5551 (88.8)	4913 (88.9)	6058 (87.2)	4744 (87.9)
Other	701 (11.2)	611 (11.1)	890 (12.8)	655 (12.1)
Education within the household				
Less than secondary school	508 (8.3)	188 (4.3)	533 (7.9)	186 (4.2)
Secondary school graduate	898 (14.7)	478 (10.9)	986 (14.6)	576 (12.9)
Some post-secondary	449 (7.3)	248 (5.6)	621 (9.2)	305 (6.8)
Post-secondary graduate	4264 (69.7)	3487 (79.2)	4627 (68.4)	3410 (76.2)
Self-perceived health				
Excellent/very good	4546 (72.7)	3902 (70.1)	4877 (70.2)	3749 (68.5)
Good	1461 (23.4)	1478 (26.5)	1690 (24.3)	1438 (26.3)
Fair/poor	242 (3.9)	191 (3.4)	378 (5.4)	289 (5.3)
Self-perceived stress[b]				
None	–	–	–	2261 (41.4)
A bit	–	–	–	2404 (44.0)
A lot	–	–	–	802 (14.6)
BMI, kg/m^2				
Obese[c]	310 (5.2)**	193 (4.2)	295 (4.3)	229 (4.6)
Overweight[d]	1011 (17.0)	643 (14.1)	981 (14.4)	758 (15.1)
Neither	4636 (77.8)	3724 (81.7)	5528 (81.2)	4028 (80.3)
Daily consumption of fruit/vegetables, servings				
< 5	3591 (58.5)**	2486 (50.1)	4050 (59.1)**	2665 (51.6)
≥ 5	2547 (41.5)	4608 (49.9)	2808 (40.9)	2497 (49.4)
Physical activity				
Active	2595 (49.4)*	2724 (51.7)	2699 (44.0)**	2583 (48.5)
Moderately active	1347 (25.6)	1202 (22.8)	1461 (23.8)	1150 (21.6)
Inactive	1310 (24.9)	1346 (25.5)	1976 (32.2)	1597 (30.0)
Sedentary activities, hours/week				
< 15	973 (30.1)**	1345 (26.0)	1404 (35.7)**	1414 (26.7)
15–29	1481 (45.8)	2256 (43.6)	1761 (44.8)	2358 (44.6)
30–44	583 (18.0)	1145 (22.1)	615 (15.6)	1045 (19.8)
≥ 45	198 (6.1)	427 (8.3)	149 (3.8)	474 (9.0)

Continued on the following page

TABLE 1 (continued)
Characteristics and descriptive statistics of adolescent respondents (aged 12–17 years) in the 2000/2001 and 2007/2008 Canadian Community Health Survey samples

	CCHS respondents, n (%)			
	12–14 years		15–17 years	
	2000/2001 (n = 6251)	2007/2008 (n = 5574)	2000/2001 (n = 6947)	2007/2008 (n = 5476)
Cigarette smoking				
Daily	185 (3.0)**	51 (0.9)	1005 (14.5)**	450 (8.2)
Occasional	190 (3.0)	82 (1.5)	435 (6.3)	307 (5.6)
Non-smoker	5877 (94.0)	5430 (97.6)	5508 (79.3)	4703 (86.1)
Alcohol drinking				
Regular	335 (5.4)**	219 (3.9)	2288 (33.2)*	1859 (34.3)
Occasional	1069 (17.2)	747 (13.5)	1987 (28.9)	1410 (26.0)
Non-drinker	3809 (77.4)	4581 (82.6)	2609 (37.9)	2155 (39.7)
Binge drinking				
Yes	68 (1.1)**	27 (0.05)	920 (13.2)	683 (12.6)
No	6184 (98.9)	5521 (99.5)	6028 (86.8)	4723 (86.4)

Abbreviations: BMI, body mass index; CCHS, Canadian Community Health Survey.

[a] Income level was grouped differently in the 2000/2001 CCHS survey compared to the 2007/2008 survey.

[b] Only asked of respondents ≥ 15 years in 2007/2008.

[c] BMI 26.02 kg/m^2 for males aged 12–14 years, > 30.0 kg/m^2 for males aged 15–17 years, 26.67 kg/m^2 for females aged 12–14 years and > 30.00 kg/m^2 for females aged 15–17 years.

[d] BMI 21.22 kg/m^2 for males aged 12–14 years, 30.0 kg/m^2 for males aged 15–17 years, 21.68 kg/m^2 for females aged 12–14 years and 30.0 kg/m^2 for females aged 15–17 years.

* $p < .01$ for the difference in prevalence over the study period (χ^2 tests).

** $p < .01$ for the difference in prevalence over the study period (χ^2 tests).

TABLE 2
Canadian Community Health Survey adolescent respondents (aged 12–17 years) engaging in unhealthy behaviours by age group and sex, 2000/2001 and 2007/2008

Age group, years	CCHS survey respondents, n (%)	Number of unhealthy behaviours					
		0	1	2	3	≥4	Total
12–14	2000/2001*						
	Male	820 (25.2)	1522 (46.7)	738 (22.6)	163 (5.0)	15 (0.5)	3258
	Female	800 (26.7)	1323 (44.2)	710 (23.7)	129 (4.3)	32 (1.1)	2993
	2007/2008						
	Male	1041 (36.4)	1136 (39.7)	592 (20.7)	85 (3.0)	7 (0.2)	2862
	Female	1045 (38.5)	1076 (39.7)	508 (18.7)	70 (2.6)	14 (0.5)	2714
15–17	2000/2001*						
	Male	546 (15.7)	1139 (32.7)	999 (28.6)	498 (14.3)	307 (8.8)	3488
	Female	631 (18.3)	1152 (33.3)	972 (28.1)	416 (12.0)	288 (8.4)	3459
	2007/2008**						
	Male	577 (20.8)	899 (32.5)	755 (27.3)	367 (13.3)	170 (6.1)	2768
	Female	548 (20.3)	910 (33.6)	829 (30.6)	275 (10.2)	145 (5.3)	2707

Abbreviation: CCHS, Canadian Community Health Survey.

Note: All data are weighted by the rescaled weights. The average of the rescaled weights being 1, many of the data would be fractions; therefore, the totals in different analyses may not be exactly equal due to approximation.

* $p < .01$ for the difference between male and female adolescents (χ^2 tests).

** $p = .001$ for the difference between male and female adolescents (χ^2 tests).

adolescents (15–17 years), this increase was more modest (males: 15.7% to 20.8%; females: 18.3% to 20.3%).

Consuming less than five servings of fruit and vegetables was the most common unhealthy behaviour among both male and female adolescents who had adopted one such behaviour (males: 57.3%; females: 47.9%). Table 3 shows other unhealthy behaviours by frequency and sex. For male adolescents, the second most common unhealthy attributes were being overweight or obese (15.6%) and physically inactive (15.0%) followed by regular alcohol drinking (10.5%) and daily smoking (1.3%). Of female adolescents, 30.0% were inactive, 11.6% drank alcohol regularly, 9.0% were overweight or obese and 1.6% smoked daily.

The most common combination of unhealthy behaviours among adolescents with two such behaviours was insufficient consumption of fruit/vegetables and physical inactivity (35.3% in males and 51.1% in females) (Table 3). The second most common combination among male adolescents was insufficient consumption of fruit/vegetables and overweight/obesity (27.8%), while among female adolescents it was insufficient consumption of fruit/vegetables and regular alcohol drinking (13.7%). Eight percent of male adolescents and 5.7% of female adolescents with two unhealthy behaviours combined regular alcohol drinking with binge drinking. Only 1.8% of males and 1.4% of females combined regular alcohol dinking with daily cigarette smoking (Table 3).

Results of the bivariate χ^2 tests show that sex, income level, education level and language spoken at home were associated with engaging in unhealthy behaviours for younger adolescents (12–14 years) while place of birth was not. For the older group (15–17 years), only sex, education level and language spoken at home were significantly associated with engaging in unhealthy behaviours while self-perceived stress level, place of birth and income were not.

Results of the logistic regression analysis indicate that education level, sex and language spoken at home were significantly associated with the probability of engaging in at least one unhealthy behaviour among adolescents (Table 4). These probabilities were slightly higher for boys aged 12 to 14 years compared with their female counterparts (odds ratio [OR] = 1.18, 95% confidence interval [CI] = 1.03–1.34), but lower for boys aged 15 to 17 years compared to females in that age range (OR = 0.83, 95% CI = 0.70–0.97). Respondents speaking languages other than English/French at home had a lower risk of engaging in unhealthy behaviours (12–14 years: OR = 0.66, 95% CI = 0.51–0.85; 15–17 years: OR = 0.60, 95% CI = 0.46–0.80). Adolescents in households where the highest level of education was a high school certificate had almost twice the risk of engaging in unhealthy behaviours compared with those in households with a post-secondary degree (12–14 years: OR = 1.93, 95% CI = 1.51–2.46; 15–17 years: OR = 1.46, 95% CI = 1.11–1.92).

Discussion

In this study, I examined prevalence of smoking, obesity and overweight, physical inactivity, unhealthy eating and alcohol drinking in a nationally representative sample of Canadian adolescents in 2000/2001 and 2007/2008. This study also investigated trends of engaging in these behaviours for younger (12–14 years) and older (15–17 years) adolescents and for male and female adolescents separately, as well as the types of unhealthy behaviours adopted by adolescents and the most common combinations of such behaviours.

TABLE 3
Types of unhealthy behaviours adopted by Canadian Community Health Survey adolescent respondents by sex, 2007/2008

Number and type/combination of unhealthy behaviours		CCHS respondents, n (%)	
		Males (n = 2035)	Females (n = 1986)
One	Eats less than 5 servings of fruit/vegetables per day	1171 (57.3)	951 (47.9)
	Overweight/obese	318 (15.6)	178 (9.0)
	Physically inactive	305 (15.0)	595 (30.0)
	Regular alcohol drinking	214 (10.5)	231 (11.6)
	Daily smoking	26 (1.3)	31 (1.6)
		Males (n = 1347)	Females (n = 1337)
Two	Eats less than 5 servings of fruit/vegetables + physically inactive	467 (34.7)	683 (51.1)
	Eats less than 5 servings of fruit/vegetables + overweight/obese	374 (27.8)	156 (11.7)
	Eats less than 5 servings of fruit/vegetables + regular alcohol drinking	176 (13.1)	183 (13.7)
	Regular alcohol drinking + binge drinking	111 (8.2)	76 (5.7)
	Regular alcohol drinking + overweight/obese	73 (5.4)	37 (2.8)
	Regular alcohol drinking + physically inactive	34 (2.5)	76 (5.7)
	Regular alcohol drinking + daily smoking	24 (1.8)	18 (1.4)
	Eats less than 5 servings of fruit/vegetables + daily smoking	10 (0.7)	26 (1.9)

Abbreviation: CCHS, Canadian Community Health Survey.

TABLE 4
Results of logistic regression analysis of sociodemographic and economic correlates of adopting unhealthy behaviours by adolescents aged 12–17 years, Canada, 2007/2008

Age group, years	Variable	OR (95% CI)	*p*
12–14	Income distribution		
	Lowest 30%	1.20 (1.00–1.44)	.053
	Middle 40%	1.23 (1.03–1.45)	.017
	Highest 30%	1.00 (ref)	–
	Level of education in household		
	Less than secondary school	1.47 (1.04–2.08)	.027
	Secondary school graduate	1.93 (1.51–2.46)	< .001
	Some post-secondary	1.27 (0.96–1.70)	.100
	Post-secondary graduate	1.00 (ref)	–
	Language spoken at home		
	English/French	1.00 (ref)	–
	Other	0.66 (0.51–0.85)	< .001
	Sex		
	Male	1.18 (1.03–1.34)	.017
	Female	1.00 (ref)	–
15–17	Level of education within the household		
	Less than secondary school	1.53 (0.94–2.49)	.087
	Secondary school graduate	1.46 (1.11–1.92)	.006
	Some post-secondary	1.62 (1.10–2.40)	.015
	Post-secondary graduate	1.00 (ref)	–
	Language spoken at home		
	English/French	1.00 (ref)	–
	Other	0.60 (0.46–0.80)	< .001
	Sex		
	Male	0.83 (0.70–97)	.022
	Female	1.00 (ref)	–

Abbreviations: CI, confidence interval; OR, odds ratio; ref, reference.

Sociodemographic and economic correlates of engaging in unhealthy behaviours were also examined.

A limitation of this study arises from the fact that all the measures used were based on self-reported data, which is subject to bias.

While younger male adolescents had a slightly higher probability of engaging in unhealthy behaviours, older ones had a slightly lower probability compared with their female counterparts—a somewhat puzzling result that suggests the need for further research. This result underscores the importance of examining adolescents' behaviours separately for sex and for age.

In spite of the increase in the proportion of adolescents consuming sufficient amounts of fruit and vegetables daily, in 2007/2008 approximately half were still consuming less than the recommended amount. This proportion, however, is much lower than the 78% of U.S. youth reported consuming less than the recommended amount of fruit and vegetables.[12] While the proportion of obese or overweight adolescents aged 12 to 14 years decreased from 22.2% to 18.3% over the study period, the corresponding proportion of those aged 15 to 17 years remained almost the same at 19.7%. Although these rates are lower than those observed in the 1990s,[13] they are still far from ideal and hence require the attention of health advocates and policy makers.

Over the study period, around one-third of the 15- to 17-year-olds reported drinking alcohol regularly during the previous year, a proportion similar to that reported elsewhere.[12]

The logistic regression results indicated that language spoken at home and parents' education level are the most important demographic correlates of unhealthy behaviours among adolescents. Adolescents who speak languages other than English/French at home had a much lower probability of engaging in unhealthy behaviours. Lower levels of parental education were associated with a higher probability of unhealthy behaviours among younger as well as older adolescents, evidence supported by other research findings.[23] Low income was associated with higher odds of unhealthy behaviours among younger adolescents, but not among older ones.

Conclusion

This study was based on secondary data analysis of nationally representative samples of adolescents aged 12 to 17 years that were collected in the 2000/2001 and 2007/2008 cycles of the CCHS. The study indicated a general decrease in unhealthy behaviours among younger adolescents aged 12 to 14 years. More outreach and health educational programs should target older adolescents with a special focus on combating the detrimental effects of unhealthy eating, physical inactivity and alcohol drinking.

References

1. DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age at first alcohol use: a risk factor for the development of alcohol disorders. Am J Psychiatry. 2000;157:745-50.

2. Wardle J, Jarvis MJ, Steggles N, Sutton S, Williamson S, Farrimond H, et al. Socioeconomic disparities in cancer-risk behaviors in adolescence: Baseline results from the Health and Behaviour in Teenagers Study (HABITS). Prev Med. 2003;36(6):721-30.

3. Sturm R. The effects of obesity, smoking, and drinking on medical problems and costs. Health Aff. 2002;21(2):245-53.

4. Windle M, Windle RC. Alcohol and other substance use and abuse. In: Adams GR, Berzonsky MD, editors. Blackwell handbook of adolescence. Malden (MA): Blackwell; 2003. p. 450-69.

5. Lemstra M, Bennett NR, Neudorf C, Kunst A, Nannapaneni U, Warren LM, et al. A meta-analysis of marijuana and alcohol use by socio-economic status in adolescents aged 10-15 years. Can J Public Health. 2008;99(3):172-7.

6. Gadalla TM. Disability associated with comorbid anxiety disorders in women with chronic physical illness in Ontario, Canada. Women Health. 2008;48(1):1-20.

7. Li Z, Bowerman S, Heber D. Health ramifications of the obesity epidemic. Surg Clin North Am. 2005;85:681-701.

8. Gadalla TM. Association of obesity with mood and anxiety disorders in the adult general population. Chronic Dis Can. 2009;30(1):29-36.

9. Larsson U, Karlsson J, Sullivan M. Impact of overweight and obesity on health-related quality of life – a Swedish population study. Int J Obesity Relat Metab Disord. 2002;26:417-24.

10. Lowry R, Galuska DA, Fulton JE, Wechsler H, Kann L. Weight management goals and practices among U.S. high school students: associations with physical activity, diet, and smoking. J Adolesc Health. 2002;31(2):133-44.

11. Seo DC, Jiang N, Kolbe LJ. Association of smoking with body weight in US high school students, 1999-2005. Am J Health Behav. 2009;33(2):202-12.

12. McCracken M, Jiles R, Blanck HM. Health behaviors of the young adult U.S. population: behavioral risk factor surveillance system, 2003. Prev Chronic Dis. 2007;4(2):A25.

13. Tremblay MS, Willms JD. Secular trends in the body mass index of Canadian children. CMAJ. 2000;163(11):1429-33.

14. Pisetsky EM, Chao YM, Dierker LC, May AM, Striegel-Moore RH. Disordered eating and substance use in high school students: Results from the Youth Risk Behavior Surveillance System. Int J Eat Disord. 2008;41(5):464-70.

15. Poulin C, Van Til L, Wilbur B, Clarke B, MacDonald CA, Barcelo A, et al. Alcohol and other drug use among adolescent students in the Atlantic provinces. Can J Public Health. 1999;90:27-9.

16. Hotton T, Haans D. Alcohol and drug use in early adolescence. Health Rep. 2004;15(3):9-19.

17. Tremblay MS, Willms JD. Is the Canadian childhood obesity epidemic related to physical inactivity? Int J Obesity Relat Metab Disord. 2003;27:1100-5.

18. Babey SH, Hastert TA, Wolstein J, Diamant AL. Income disparities in obesity trends among California adolescents. Am J Public Health. 2010;100(11):2149-55.

19. Chao YM, Pisetsky EM, Dierker LC, Dohm F, Rosselli F, May AM, et al. Ethnic differences in weight control practices among U.S. adolescents from 1995 to 2005. Int J Eat Disord. 2008;41(2):124-33.

20. Garry JP, Morrissey SL, Whetstone LM. Substance use and weight loss tactics among middle school youth. Int J Eat Disord. 2003;33(1):55-63.

21. Ho CH, Kingree JB, Thompson MP. Associations between juvenile delinquency and weight-related variables: analyses from a national sample of high school students. Int J Eat Disord. 2006:39(6):477-83.

22. Allison KR, Adlaf EM, Ialomiteanu A, Rehm J. Predictors of health risk behaviours among young adults: analysis of the National Population Health Survey. Can J Public Health. 1999;90(2):85-89.

23. Kestila L, Rahkonen O, Martelin T, Lahti-Koski M, Koskinen S. Do childhood social circumstances affect overweight and obesity in early adulthood? Scand J Public Health. 2009;37:206-19.

24. 2008 Canadian Community Health Survey, cycle 4.1, 2007. Public Use Microdata Documentation. Ottawa (ON): Statistics Canada; 2008.

25. 2002 Canadian Community Health Survey, cycle 1.1, 2000/2001 [Internet]. Public Use Microdata Documentation. Ottawa (ON): Statistics Canada, 2003 [cited 2003 Jan 28].

26. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. BMJ. 2000;320:1240-3.