ABSTRACT

We conducted in-class written surveys of fourth to eighth grade children's eating and smoking behaviours in southwestern Ontario (n=870) and Charlottetown (n=423) in order to facilitate local school boards' and health units' planning of health education initiatives. Using chi-square analysis, we examined sex, grade, provincial and rural-urban differences in behaviours. No rural-urban differences emerged. While students reported few gender differences in food group consumption, more PEI students consumed French fries, snack foods, cakes and cookies, and regular soft drinks daily. Only 60.1% (379/630) of girls and 70.0% (462/660) of boys ($\chi^2 = 13.8$; $p < 0.001$) ate breakfast every day, falling to 53.2% (115/216) among eighth grade girls, and 32.9% (25/76) among students who smoked. The prevalence of smoking was 4.8% (n=40) in Ontario and 8.5% (n=36) in PEI ($\chi^2 = 6.8$; $p < 0.01$). Compared to non-smokers, a higher proportion of students who smoked consumed snack foods and regular soft drinks daily. The results emphasize the need to promote healthy eating behaviours and anti-smoking messages among school children.

ABRÉGÉ

Nous avons administré des questionnaires écrits sur les habitudes alimentaires et le tabagisme dans des classes d'enfants de la 4^e à la 8^e année du Sud-Ouest de l'Ontario (n=870) et de Charlottetown (n=423) afin de faciliter la planification des projets d'éducation sanitaire des conseils scolaires et des services de santé locaux. Par analyse du khi-carré, nous avons examiné les différences de comportement selon le sexe, la classe, la province et le milieu (urbain ou rural). Nous n'avons constaté aucune différence entre les milieux urbain et rural. Les élèves présentaient peu de différences selon le sexe dans leur consommation des groupes d'aliments, mais ceux de l'Î.-P.-É. étaient plus nombreux à consommer quotidiennement frites, grignotines, gâteaux, biscuits et boissons gazeuses ordinaires. À peine 60,1 % (379/630) des filles et 70 % (462/660) des garçons ($\chi^2=13,8$; $p<0,001$) prenaient un petit déjeuner tous les jours, et ces taux chutaient à 53,2 % (115/216) chez les filles arrivées en 8^e année et à 32,9 % (25/76) chez les fumeurs. La prévalence du tabagisme était de 4,8 % (n=40) en Ontario et de 8,5 % (n=36) à l'Î.-P.-É. ($\chi^2=6,8$; $p<0,01$). Les fumeurs étaient proportionnellement plus nombreux que les non-fumeurs à consommer quotidiennement des grignotines et des boissons gazeuses. Ces résultats confirment qu'il faut promouvoir de saines habitudes alimentaires et diffuser des messages anti-tabac auprès des écoliers.

Eating and Smoking Behaviours of School Children in Southwestern Ontario and Charlottetown, PEI

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There is growing recognition that risk factors for chronic diseases are evident in children and adolescents.^{1,2} Cardiovascular risk factors such as elevated blood pressure and unfavourable serum lipid profiles track from childhood to adulthood.³ Obesity⁴ and tobacco use are associated with these risk factors, and the prevalence of obesity^{5,6} and smoking^{7,8} among school-aged children is rising. In a recent study of low income 8 year olds in Ontario, 5% ate nothing for breakfast, and one child in five was overweight despite energy intakes lower than recommended.^{9,10} Unhealthy eating patterns in childhood can adversely affect health, contribute to chronic disease in later life, and are difficult to change once established.¹¹ Thus, a primary issue for school-aged children is the reduction of risk factors through the adoption of healthy behaviours.

It is important to identify less-than-ideal behaviours early and to try to effect changes because of the evidence that eating behaviours established in childhood persist. In their study of this phenomenon, Kelder et al.¹² asked sixth grade students to indicate their preference among 18 food pairs (healthy and less healthy choices); the rankings of healthy food choices were maintained through six years of follow-up. As well, behaviours tend to cluster; for example,

smoking rates are higher among adolescents with poor activity and eating behaviours.¹³

In 1998, school boards and health units in Charlottetown, PEI and Perth County, Ontario expressed a commitment to develop health education initiatives targeting school children. Several programs to promote healthy behaviours in school children have been developed and evaluated.¹⁴ In order to choose programs wisely, however, and to target programs appropriately for each school,¹⁵ it is important to know the current health behaviours of school children. To our knowledge, this was the first opportunity to describe and compare eating and smoking behaviours among fourth to eighth grade children in Ontario and PEI. Our results, along with findings from related surveys, will be useful in planning strategies to improve health behaviours in this age group.

METHODS

We established an advisory group in each community comprised of representatives from local school boards and the public health unit. The advisory group reviewed the survey to ensure that it contained information needed to plan a health education program. The questions on eating behaviours were based on a recent report of the foods eaten by young school-age children.¹⁶ We included questions on the frequency of consumption of 27 different groups of foods to help identify areas of concern, such as low consumption of fruits and vegetables, high intake of high fat foods, or high intake of "empty calorie" foods (high in energy, often from fat, but provide few nutrients). Students indicated their frequency of consumption during the previous seven days as follows: "at least twice a day", "once a day", "2 to 4 times/week", "5 to 6 times/week" and "never". We combined the responses "at least twice a day" and "once a day" to

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form the category “daily”. We calculated the number of servings of fruits and vegetables per day by adding responses to the frequency of consumption of potatoes (other than French fries), salad, other vegetables, fruit, and fruit juices as follows: “at least twice a day” = 2, “once a day” = 1, and “5 to 6 times a week” = 0.5. Additional questions determined the proportion of students who did not eat breakfast, and the fat content of milk usually consumed.

We assessed smoking behaviours using the Student Smoking Profile¹⁷ which includes questions on attitudes towards smoking, and, among those who smoke, additional smoking behaviours. We defined students as “currently smoking” if they answered “yes” to “Have you ever tried cigarette smoking (even just one puff)?”, “yes” to “Have you ever smoked again since the first time you tried a cigarette?”, and “no” to “At this time, have you quit smoking?”¹⁵

In Ontario, the advisory group recruited a non-random sample of rural and urban schools by contacting individual principals. The advisory group in PEI followed a similar process; however, all schools were located within Charlottetown. Based on teacher reports, approximately 90% of all students in grades 4 through 8 completed the questionnaire in Ontario (n=870) and 85% in PEI (n=423). Students put no identifying information on the surveys and instructions assured them of the confidentiality of their responses.

We examined health behaviours by grade rather than by age because that is the basis for program planning. We used chi-square analysis to test for differences in behaviours by gender, grade, location (rural or urban), region, daily breakfast consumption, and smoking status. Unless otherwise stated, differences at $p < 0.05$ were accepted as significant. There were no differences between rural and urban schools, either in Ontario alone, or when all students were included. We pooled the data where there were no provincial differences in smoking or eating behaviours; otherwise, such differences are noted.

RESULTS

Boys and girls differed in the daily consumption of some food groups (Table I). More students in PEI had French fries,

TABLE I
Proportion (% , n) of Boys (n=662) and Girls (n=631) Consuming Foods from Selected Groups Daily During the Previous Week

Food Group	Boys	Girls
Milk	73.4 (482)	68.8 (433)
French fries	17.9 (117)	17.8 (111)
Vegetables (other than salad or potatoes)	52.0 (343)	60.4 (375)
Salads	23.9 (156)	29.3 (184)*
Peanut butter	32.3 (212)	25.6 (160)*
Fruit	63.9 (417)	67.8 (421)
Fruit juice	68.0 (444)	69.7 (432)
Pizza	14.3 (93)	11.0 (68)
Ready-to-eat cereals	55.2 (360)	45.4 (284)*
Processed meats	37.3 (244)	30.8 (191)*
Potato chips	39.7 (259)	36.7 (228)
Candy	35.9 (234)	35.7 (224)
Regular soft drinks	39.2 (257)	33.8 (211)*

* chi-square statistic for differences by sex significant at $p < 0.05$

TABLE II
Proportion (% , n) of Students in Ontario (n=870) and PEI (n=423) Consuming Foods from Selected Groups Daily

Food Group	Ontario	PEI
French fries	12.5 (109)	28.1 (119)**
Vegetables (other than salad or potatoes)	58.0 (505)	50.4 (213)*
Potato chips	34.9 (304)	43.3 (183)*
Cakes, cookies, pie, doughnuts	34.6 (301)	42.6 (180)*
Regular soft drinks	31.5 (274)	45.9 (194)**

* chi-square statistic for differences by province significant at $p < 0.05$; ** $p < 0.001$

TABLE III
Frequency (% , n) of Daily Breakfast Consumption by Grade for Boys (n=662) and Girls (n=631)

Grade	Boys	Girls	Total
4	76.1 (70)	76.0 (57)	76.0 (127)
5	66.3 (57)	71.3 (57)	68.3 (114)
6	75.9 (63)	71.0 (49)	73.7 (112)
7	69.0 (158)	53.2 (101)	61.8 (259)
8	67.1 (114)	53.2 (115)	59.0 (229)

snack foods, cakes and cookies, and regular soft drinks every day compared to Ontario students (Table II). The average daily number of servings of fruits and vegetables was 4.2 (± 2.0) with no difference between boys (39.5%, n=261) and girls (41.6%, n=262) in the proportion who consumed 5 or more servings daily. Few children (9.6%, n=122) reported drinking whole milk; most boys (62.7%, n=407) and girls (55.2%, n=341) consumed milk with a 2% fat content.

Fewer than 3% (n=38) of the students reported that they “never” had breakfast. Girls (60.1%, n=379) were less likely to eat breakfast every day compared to boys (70.0%; n=462) ($\chi^2 = 13.8$; $p < 0.001$). Only 58.3% (n=246) of children in PEI ate breakfast daily compared to 68.7% (n=598) in Ontario ($\chi^2 = 13.5$; $p < 0.001$).

Boys reported fairly consistent rates; however, in grades 7 and 8, less than two thirds of the girls reported eating breakfast every day (Table III). There were few provincial differences in daily breakfast consumption within each grade. Among grade 7 boys, only 52.9% (n=36) of those in PEI ate breakfast daily compared to 75.8% (n=122) in Ontario ($\chi^2 = 11.7$; $p < 0.001$); findings were similar for boys in grade 8 (56.5%, [n=35] in PEI, and 73.1% [n=79] in Ontario) ($\chi^2 = 5.0$; $p < 0.05$).

The prevalence of smoking of 4.8% (n=40) in Ontario differed from that in PEI (8.5%; n=36; $\chi^2 = 6.8$; $p < 0.01$) with no difference in overall rate between boys and girls. Smoking rates increased among boys from 3.1% (n=3) in grade 4 to 11.3% (n=14) in grade 8. None of the girls in grades 4 and 5

TABLE IV

Reasons for Smoking Among Elementary Students Who Smoke* (n=76)

	%
My friends smoke	52.6
I'm addicted to cigarettes	44.7
I smoke when I'm stressed out and want to relax	40.8
It's easy to get cigarettes	39.5
I smoke at special events (parties, concerts)	32.9
It's enjoyable	31.6
My brothers and sisters smoke	26.3
Someone pressures me into it	10.5
I'm bored, there's nothing else to do	19.7
I like the image smoking gives me	10.5
My parents offer it to me	6.6

* students were allowed to check more than one

TABLE V

Reasons* for Not Smoking (n=1179)

Reasons	%
I think it may be harmful to my health	79.0
I have other things I enjoy doing	66.4
I am not interested in smoking	66.1
It is a waste of money	64.1
I have seen bad examples of what smoking can do	62.2
I know that my parents would not approve	55.6
It will affect my athletic ability	54.4
I think it may be addictive	44.2
My friends disapprove of smoking	27.8
I tried smoking, but I don't like the taste	13.2
I just experimented with smoking and did not plan to do it again	11.6
I tried smoking, but I don't like the effect it has on me	11.0

* students were allowed to check more than one

TABLE VI

Proportion (% , n) of Students Who Ate Breakfast Every Day (n=838) and Those Who Did Not (n=445) Consume Foods from Selected Groups Daily

Food Group	Breakfast Daily	Less Than Daily or Never
Milk	76.8 (644)	60.4 (269)**
Cheese	36.8 (307)	29.8 (133)*
French fries	15.5 (129)	22.2 (98)*
Vegetables (other than salad or potatoes)	59.3 (493)	50.0 (223)**
Peanut butter	31.0 (258)	25.1 (112)*
Ready-to-eat cereals	57.4 (478)	37.0 (163)**
Regular soft drinks	33.9 (283)	41.6 (184)*

* chi-square statistic for differences by breakfast consumption significant at $p < 0.05$; ** $p < 0.001$

reported smoking; rates increased from 2.9% (n=2) in grade 6 to 8.8% (n=19) in grade 8. Most students (89.2%, n=1056) knew that "second hand smoke is harmful" and agreed (78.1%, n=915) that "tobacco smoking is addictive". Among those currently smoking, 56.0 % (n=42) answered "very likely" or "somewhat likely" to "How likely do you think it is that smoking will lead to health problems for you?"

Among students who were currently smoking, their main reason was "My friends smoke" (Table IV). The most common sources for cigarettes were "someone buys them for me" and "I get them from my friends"; few said "I buy them". The

most common location for smoking was "at parties" followed by "walking to/from school". Students who were not current smokers were asked "If you don't smoke now, what are your reasons for not smoking?" The top reason was "I think it may be harmful to my health" (Table V).

We found some interrelationships among health behaviours. The proportion of students who had milk, cheese, ready-to-eat (RTE) cereals, vegetables, and peanut butter every day was higher among those who ate breakfast daily (Table VI). French fries and regular soft drinks were consumed more often among students who did not eat breakfast every day.

Compared to non-smokers, more students classified as current smokers daily consumed snack foods (49.3% [n=37] vs 37.2% [432], $\chi^2 = 4.4$; $p < 0.05$) and regular soft drinks (51.4% [n=38] vs 35.8% [418], $\chi^2 = 7.3$; $p < 0.05$). In addition, 67.2% (n=791) of the non-smokers ate breakfast daily compared to 32.9% (n=25) of those currently smoking ($\chi^2 = 35.6$; $p < 0.001$).

DISCUSSION

Through this survey, we have identified a need for the development of healthy eating behaviours and an increased emphasis on antismoking messages among school children in these communities. While the relative monoculture context for the survey sample suggests caution in generalizing to larger multicultural centres, the findings indicate areas of concern that need to be examined as part of local strategies. Over one third of the students in our survey ate candy and chocolate bars, snack foods (potato chips, etc.) and regular soft drinks every day. In a recent national survey of adolescents, 22-28% had candy and chocolate bars, 13-22% ate potato chips, and 34-56% drank soft drinks every day.¹⁸ We also found that students in PEI had higher consumption rates for snack foods, soft drinks, and French fries, suggesting that regional differences need to be considered when planning local programs. Although we did not measure weight and height, recent evidence links soft drink consumption to obesity in school children.¹⁹

Education programs should encourage healthier snack foods, such as fruit and other low fat snacks. Increased consumption of fruits and vegetables is the main focus of recent nutrition initiatives, not only to replace snack foods high in fat, but also because of the strong association with a reduced risk of chronic diseases such as cancer and heart disease in later life.²⁰ Recent Canadian data suggest that daily consumption of fruits and vegetables has dropped by 7-17% among children in grades 6 and 8 between 1990 and 1998.¹⁸ The results from our survey confirm that this is an important area for health promotion efforts.

Close to three quarters of the students consume milk daily, usually with 2% fat content. Choosing lower fat milk is widely recommended as a simple way to reduce the

fat content of the diet and should be considered a positive finding. In light of the new calcium recommendation for adolescents of 1300 mg/day,²¹ students need to be encouraged to eat high calcium foods, including non-dairy sources such as calcium-fortified orange juice and soy beverages.

One quarter or more of the children in each grade reported that they do not eat breakfast every day, with a sharp increase among girls beginning in grade 7. Children who do not eat breakfast are less likely to have an adequate diet overall compared to those who have breakfast.²² There is also growing evidence that breakfast enhances cognitive development and academic performance.^{23,24} There may be a number of reasons why they did not eat breakfast such as personal preference (not feeling hungry in the morning, preferring to sleep in) but another possibility is that girls are skipping breakfast as one form of dieting. This is a cause for concern as this may increase the risk of eating disorders.²⁵

Most students acknowledged that smoking is addictive, that second hand smoke is harmful, and think it likely that smoking will lead to health problems. While the high level of awareness of health issues related to smoking indicates that students have received information on the health hazards, this knowledge alone is not a sufficient deterrent. Although the prevalence of smoking was low, over one third of the students had tried cigarettes. While this is less than the proportion (41%) of Canadian children aged 11 to 15 years who have tried smoking,²⁶ it is still a concern because of the increased likelihood that experimenting with cigarettes will lead to smoking as a regular activity.¹² In addition, smoking rates generally increase dramatically after grade 8.¹⁵ Therefore, lower rates in elementary schools are not a signal to slow education efforts.

The best opportunity to develop lifelong healthy eating behaviours is with elementary school children.¹¹ This is also the ideal time to discourage smoking. Research with adults²⁷ and older adolescents²⁸ has demonstrated that unhealthy eating behaviours are more common among smokers. While the small number of students identified as "currently smoking" in this study precluded an extensive analysis of the interrelationships among smoking and eating behaviours, our findings indicate that a smaller proportion of

non-smokers adhered to some of the less desirable dietary practices. In addition, it would have been helpful to have information on other influences on eating and smoking behaviours, such as household income, and parental education and employment.

Based on these findings, the advisory groups plan to develop a health initiative for schools in their district. The school setting is considered ideal for health promotion and nutrition education programs.¹¹ While the lack of federally mandated school lunch programs in Canada means that one of the main channels for nutrition education in American interventions is not available, there are Canadian programs that can be incorporated into a school-based health promotion initiative.²⁹ Establishing healthy behaviours early in life has both short-term and long-term benefits: improved health and well-being in adolescence and reduced risk of chronic diseases in later life.

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