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Who Misses Lunch on School Days in Canada?

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ABSTRACT

This study assessed the prevalence and predictors of not eating lunch on school days among Canadian children using dietary data from the 2015 Canadian Community Health Survey-Nutrition (n = 2,991 children aged 6–17 years). On a given school day, more than 1 in 20 students reported eating no lunch. Students were more likely to miss lunch if they were older, lived in a food insecure household, or smoked. Sex, ethnicity, income and weight status were not associated with lunch consumption. Future research is needed to fully understand the frequency, causes and consequences of missing lunch on school days in Canada.

KEYWORDS

Children; lunch; school; meal skipping; Canada

Introduction

There is growing interest in how children's dietary patterns and the context in which meals are consumed influence their overall health and well-being.^{1,2} Evidence largely collected outside of Canada suggests that infrequent or irregular meal consumption (primarily breakfast) is associated with poorer dietary quality,^{3–7} higher risk of overweight and obesity,^{7–11} lower levels of physical activity¹² and reduced academic performance among children.^{9,13} While the majority of the evidence has examined the influence of irregular breakfast consumption, relatively few studies have examined the prevalence or patterns of missing other meals including lunch.^{10,11,14,15} While Canada's most recent national food guide now recommends that “children be offered healthy meals and snacks at regular times throughout the day,”¹⁶ no recent studies have carefully examined the prevalence or predictors of missing the lunch meal among Canadian children. Such analyses are important steps in better understanding the mealtime experiences of Canadian families at a time when several policy debates have emerged about how to improve stable and regular access to nutritious foods and bolster the dietary quality of Canadian youth.

Canadian children spend a substantial portion of their waking hours at school and consume an estimated 1/3 of their daily energy intake during school hours.^{17,18} Therefore, the school setting is an important and under-

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researched context for examining potentially modifiable determinants of health and dietary inequalities. Unlike the U.S. and most other affluent countries, Canada does not currently have a national school lunch program and most children bring a packed lunch from home.^{19–21} One study drawing on nationally representative dietary data from the 2004 Canadian Community Health Survey (CCHS) reported that approximately 6% of Canadian children reported consuming no lunch on a given school day.²¹

To our knowledge, there are no recent analyses documenting the prevalence or predictors of Canadian children not eating lunch on a given school day or how often children do not eat lunch at school. While several studies have examined sociodemographic predictors of breakfast meal patterns,^{9,22,23} little evidence has investigated factors associated with children's likelihood of not consuming lunch, with data particularly lacking from the Canadian context. Cross-sectional evidence from the U.S. suggests that socio-demographic factors including children's age, sex and ethnicity are associated with children's odds of not eating lunch. Not eating lunch is more commonly reported among older youth,²⁴ girls compared to boys,^{12,24} and among Hispanic and non-Hispanic Black compared to White children.^{12,24} Despite policy efforts to reach vulnerable children in schools, U.S. evidence also indicates that children living in lower income households (defined as a household income which falls close to or below the federal poverty line) are more likely to miss lunch on both school days and on weekend days.²⁴ In the Netherlands, a study examining the influence of socioeconomic indicators on children's likelihood of missing lunch suggests that children whose fathers have lower educational attainment are more likely to miss lunch.¹⁴ Similarly, a study conducted in a large sample of adolescents in Denmark suggests that not eating lunch is more frequent among older adolescents, children from immigrant families and those living in lower and medium family social classes.¹⁵

Children who miss meals may be at higher risk for other compromising health behaviors such as disordered eating or unhealthy weight controlling behaviors.^{25,26} Available international evidence examining health behaviors associated with missing breakfast suggests that adolescents who smoke,^{27,28} consume alcohol more frequently,^{28,29} and are less physically active^{12,28} are more likely to report not consuming breakfast. No study has explored whether such individual or family-level socio-demographic factors are relevant in the Canadian context and little research has explored whether any of these lifestyle behaviors are associated with missing lunch. Such insights are imperative for informing emerging national school lunch provisioning policies and local initiatives.³⁰

Canada's 2019 federal budget declared the Government's intention to develop a national school meal program aiming to improve access to healthy meals at school,³⁰ and following the COVID-19 pandemic, several provincial governments have been actively debating policy options for improving access

to nutritious foods for children at school.^{31–33} Improved knowledge regarding who is at the highest risk of not eating lunch can help inform future national efforts and ongoing local interventions to ensure that all children have access to healthy foods at school. In 2015, Statistics Canada conducted a nationally representative nutrition survey known as the 2015 CCHS – Nutrition.³⁴ The release of these data therefore provided an opportunity to assess the prevalence with which children reported not eating lunch on a given school day and to identify characteristics associated with not eating lunch.

Materials & Methods

Data Source and Analytical Sample

Nationally representative data were obtained from the 2015 CCHS – Nutrition, the most recent national dietary survey targeting Canadians aged 1 year and older living in private dwellings in Canada's 10 provinces.³⁴ The CCHS 2015 used a multistage stratified cluster sampling design to obtain a sample that was nationally representative for age, sex, geography and socio-economic status ($n = 20,487$; response rate 61.6%).³⁴ A computer-assisted 24-hour recall asked respondents about all foods and beverages consumed from midnight to midnight on the previous day, including types and amounts of foods as well as contextual variables such as eating occasion (e.g. breakfast, lunch, snack), time of consumption, and where the meal or snack was consumed.³⁵ A second 24-hr recall (conducted on the phone) was obtained from a sub-sample of participants ($n = 7,623$ respondents). Interviews for children aged 6 to 11 years were conducted with parental assistance and respondents aged 12 years and above answered on their own. Ethics approval was granted by the Statistics Act of Canada, and access to these data was provided by Statistics Canada's Research Data Center Program.³⁶

The analytical sample included school-aged children (aged 6–17 years) who reported a first or second 24-hour dietary recall which fell on a Canadian school day in 2015 ($n = 2,991$ children). Weekend days, Christmas/winter holidays and summer school vacation months as well as Canadian national holidays (Easter, Victoria Day, Canadian Thanksgiving) were excluded from the analyses.

Identifying Lunch Consumers and Non-Consumers

Lunch consumption was self-reported and included any food or beverage consumed at an eating occasion that the participant defined as 'lunch' during the first 24-hour recall (if it fell on a school day) or on the second 24-hour dietary recall (if the first recall did not fall on a school day).³⁴ Participants who did not have a single dietary recall on a school day were dropped from the

analysis. Those who did not report any items during lunch on their first available school day recall were classified as 'lunch non-consumers' and described here as 'not eating lunch.' To examine whether the prevalence of lunch non-consumption on a single school day was sensitive to whether data was collected from a first (in-person) recall compared to a second (telephone) recall, prevalence of children missing lunch was compared between the two subsamples of participants.

Demographic, Socioeconomic and Lifestyle Variables

Demographic, socioeconomic and lifestyle variables were obtained from the CCHS General Health Component questionnaire.³⁷ Demographic variables included sex, age (in years), ethnicity (White, Chinese, South Asian, Black, Filipino, Latin American, Southeast Asian, Arab, West Asian, Japanese, Korean, Other), and residential location (rural vs. urban). Socioeconomic indicators included relative household income (in deciles), parental education and food insecurity status. The income variable used (ten decile categories, from lowest to the highest) provided a measure of household income relative to the household incomes of all other respondents.³⁵ The variable parental education (indicating the highest level of education acquired by any member of the household aged 14 years or older) was coded into three categories: 1) obtained a high school diploma or less, 2) obtained a trade certificate or college diploma,¹ or 3) obtained a university degree (e.g., bachelor's degree or higher). Household-level food insecurity status was measured using the Household Food Security Survey Module (HFSSM), which contained 18 questions used to assess "uncertain, insufficient or inadequate food access, availability and utilization due to limited financial resources, and the compromised eating patterns and food consumption that may result" in the previous 12 months.³⁸ The food insecurity status of child and adult members of the household was determined by the number of food-insecure conditions reported, i.e., by the number of questions in the HFSSM that the respondent answered affirmatively on behalf of the household. To be considered food secure, no items or only 1 item (in the adult or child scale) were affirmed. In these analyses, food insecurity was recoded as a dichotomous variable (food secure vs. food insecure) which collapsed the moderate and severely food insecure categories due to the smaller sample sizes in the food insecure subgroups as well as to facilitate comparison with previous studies.

Health/lifestyle variables examined here included smoking status, supplement use and weight status. Smoking was only asked to respondents aged 12 years or older ($n = 1,624$). Respondents were asked "At the present time, do you smoke cigarettes daily, occasionally or not at all?," with response items as follows: daily, occasionally, not at all, valid skip (for respondents under age 12), don't know, refusal, not stated. For this analysis, responses were

dichotomized as either nonsmoker vs. daily or occasional smoker. Supplement use was dichotomized into whether respondents had taken a vitamin/mineral supplement in the past 30 days or not (yes/no). Weight status categories (underweight, normal weight, overweight and obese) were computed using the body mass index age- and sex- specific Z score cutoffs set by the World Health Organization (WHO))^{39,40} for a subsample of respondents with measured weights and heights ($n = 2,653$).

Statistical Analyses

Sampling weights were applied to all analyses to generate nationally representative estimates and to account for unequal probability of selection and non-response. Robust standard errors were derived using the 500 sets of bootstrap weights provided by Statistics Canada.⁴¹ All analyses were conducted using Stata 13 (LP Stata Corp, Tex., U.S.), with significance defined as $P\text{-value} < 0.05$.

Descriptive statistics (means, proportions and robust standard errors) were used to examine the demographic, socioeconomic and lifestyle characteristics of lunch consumers and lunch non-consumers. Multivariable logistic regression models were used to test associations of demographic, socioeconomic and lifestyle characteristics with children's odds of not consuming lunch. The model development process was theory driven. Crude odds ratios (OR) were first generated to examine whether each independent variable on its own (e.g., children's age in years, sex, smoking status, etc.) was associated with not consuming lunch (Models 1). As previous research outside of Canada had identified age and sex to be important predictors of lunchtime eating behaviors,^{12,24} a second set of models was then tested with age (in years) and sex added simultaneously to consider the potentially confounding effects of age and sex on other independent variables (Models 2). Finally, fully adjusted ORs were then generated, adjusting for all covariates simultaneously (age in years, sex, location of residence, ethnicity, immigration status, income, parental education, food insecurity status, smoking status, supplement use, and child's weight status) (Models 3). A separate answer category for respondents who did not provide an answer to the question (i.e., "missing") was created for the ethnicity, food insecurity, smoking and weight status variables to avoid dropping these respondents' data from the multivariable regression models.

Results

A total of 2,540 children aged 6–17 years reported a first 24-hour dietary recall that occurred on a school day while 821 children reported a second 24-hour dietary recall during a Canadian school day, with a similar proportion of children reporting not eating lunch on either day (6.0% on the first 24-hour dietary recall and 5.2% on the second 24-hour dietary recall) ($p\text{-value} > 0.05$).

Table 1. Sociodemographic, health and lifestyle characteristics of Canadian children aged 6–17 years on school days in the 2015 Canadian Community Health Survey (CCHS 2015 – Nutrition) (n = 2,991 children)^a.

Characteristic	All children, n = 2,991	Lunch consumers, n = 2,818	Lunch non-consumers, n = 173
All children, %	100	94.0 ± 0.8	6.0 ± 0.8
Age, mean years	11.6 ± 0.1	11.5 ± 0.1	13.3 ± 0.5
Age group, %			
6–13 years	64.5 ± 0.9	95.8 ± 0.9	4.2 ± 0.9
14–17 years	35.5 ± 0.9	90.7 ± 1.4	9.4 ± 1.4
Sex, %			
Male	51.1 ± 1.1	94.6 ± 1.0	5.4 ± 1.0
Female	49.0 ± 1.1	93.4 ± 1.4	6.6 ± 1.4
Food security status ^b , %			
Food secure	87.6 ± 1.0	94.7 ± 0.8	5.3 ± 0.8
Food insecure	11.1 ± 0.9	90.2 ± 2.9	9.8 ± 2.9
Missing food security	1.3 ± 0.3	78.2 ± 9.9	21.8 ± 9.9
Parental educational attainment, %			
High school diploma or less	16.7 ± 1.1	88.2 ± 1.9	11.8 ± 1.9
College/trade diploma	38.9 ± 1.4	97.0 ± 0.6	3.0 ± 0.6
University degree	44.4 ± 1.6	93.6 ± 1.6	6.5 ± 1.9
Location of residence, %			
Rural	19.0 ± 1.3	94.3 ± 1.4	5.7 ± 1.4
Urban	81.0 ± 1.3	93.9 ± 1.0	6.1 ± 1.0
Ethnicity, %			
White	68.1 ± 1.6	93.5 ± 1.1	6.5 ± 1.1
Nonwhite	28.2 ± 1.6	95.0 ± 1.2	5.0 ± 1.2
Missing	3.8 ± 0.4	94.6 ± 2.1	5.4 ± 2.2
Immigrant ^d , %			
Non-Immigrant	88.7 ± 1.0	94.0 ± 0.9	6.0 ± 0.9
Immigrant	11.3 ± 1.0	93.5 ± 2.4	6.5 ± 2.4
Current smoker ^e , %			
Nonsmoker	97.4 ± 0.5	92.2 ± 1.1	7.9 ± 1.1
Smoker	2.6 ± 0.5	X	X
Supplement use, %			
No	62.5 ± 1.5	93.4 ± 1.1	6.6 ± 1.1
Yes	37.5 ± 1.5	95.0 ± 1.1	5.0 ± 1.1
Weight status ^f , %			
Normal weight	67.7 ± 1.4	93.5 ± 1.2	6.5 ± 1.2
Overweight/obese	32.3 ± 1.4	94.2 ± 1.2	5.8 ± 1.2

Values are displayed as survey-weighted proportions (%) ± Standard Error (SE) or as mean age (years) ± SE. Proportions (percentages) are summed sideways for the third and fourth columns since they represent the percentage of children who consumed and missed lunch within each sociodemographic or lifestyle group (e.g., the proportion of children aged 6–13 years who consumed and missed lunch).

^aThe sample (n = 2,991 children) includes children with a first dietary recall occurring on a school day and children who had their first dietary recall on a weekend/non-school day and their second dietary recall occurring on a school day. If a child reported a dietary recall on two school days, this analysis only considered the first dietary recall day when classifying them as a 'lunch consumer' or 'lunch non-consumer.'

^bMissing data on 38 children (food security status).

^cMissing data for 3 children (education).

^dMissing data for 2 children (immigrant status).

^eSmoking status was asked to respondents aged 12 years and older (n = 1,624 children, missing data on 3 children). Cells marked with an "X" are blanked due to minimum cell size requirements for releasing descriptive statistics from Statistics Canada (cross-tabulation of smoker and children who missed lunch).

^fApplicable to respondents who had their weights and heights measured (n = 2,653 children, missing data on 227 children). This derived variable classifies children and youth aged 5 to 17 years (61 to 215 months) as "underweight," "normal," "overweight" or "obese" according to the age-and-sex specific body mass index (BMI) cutoff points as defined by the World Health Organization (WHO).

Table 1 presents the characteristics of children aged 6–17 years who reported a first and/or second 24-hour dietary recall falling on a Canadian school day in 2015 ($n = 2,991$ children). From this representative sample of single school days that covered a range of seasons and weekdays in 2015, approximately 6% of children reported not eating lunch.

Children who lived in food insecure households were more likely to not eat lunch compared to children living in food secure households. A higher proportion of children whose parents had a high school diploma or less did not eat lunch compared to those with higher levels of educational attainment. Among children age 12 years and older, a higher proportion of smokers did not eat lunch compared to nonsmokers.

Table 2 presents the crude (Model 1) and age and sex adjusted model (Model 2) and finally, the fully adjusted model (adjusted for children's sex, age, rural vs. urban location of residence, ethnicity, immigration status, parental income, educational attainment, food insecurity status, smoking status, supplement use, and child's weight status) (Model 3). The odds of not eating lunch increased with older age (fully adjusted OR: 1.24 for each additional year, 95% CI: 1.04, 1.48). Children living in food insecure households were twice as likely to miss lunch compared to their peers living in food secure households (fully adjusted OR: 2.03, 95% CI: 1.01, 4.10). Children whose parents completed high school or less were 4 times more likely to not eat lunch (fully adjusted OR: 4.05, 95% CI: 2.24, 7.33) compared to their counterparts whose parents had a college/trade diploma or certificate. Children whose parents had a university degree (Bachelor's degree or higher) also had higher odds of not eating lunch compared to children's whose parents had neither the highest nor lowest levels of educational attainment (fully adjusted OR: 2.36, 95% CI: 1.16, 4.82).

Among older youth (children aged 12 years and older), smokers had higher odds of not eating lunch on school days (fully adjusted OR: 2.71, 95% CI: 1.04, 7.05) compared to students who did not smoke. Lunch consumption was not associated with any of the other characteristics measured in this study (children's sex, location of residence, identifying as White vs. nonwhite, immigration status, relative parental income, supplement use, weight status).

Discussion

The objectives of this study were to identify the population-level prevalence and factors associated with not eating lunch in a large nationally representative sample of Canadian children. On a given school day in 2015, approximately 6% of Canadian children did not report eating any lunch. Age, household food insecurity, parental educational attainment and smoking emerged as the most salient predictors of not eating lunch on school days.

Table 2. Associations between Canadian children's demographic, socioeconomic and health characteristics and the odds of not consuming lunch in the 2015 Canadian Community Health Survey (CCHS 2015 – Nutrition)^a.

	Unadjusted models n = 2,991		Age and sex adjusted models n = 2,991		Fully adjusted model ^b n = 2,985	
	OR	95% CI	OR	95% CI	OR	95% CI
Age, in years	1.17	1.07, 1.29	1.17	1.07, 1.29	1.24	1.04, 1.48
Sex						
Male	1.00	-	1.00	-	1.00	-
Female	1.25	0.68, 2.27	1.25	0.68, 2.30	1.27	0.68, 2.40
Food security status						
Food secure	1.00	-	1.00	-	1.00	-
Food insecure	1.96	0.99, 3.86	2.14	1.09, 4.22	2.03	1.01, 4.10
Missing food security	5.00	1.25, 20.0	3.07	0.77, 12.2	3.59	0.85, 15.10
Parental education						
College/trade diploma or certificate	1.00	-	1.00	-	1.00	-
High school diploma or less	4.28	2.44, 7.52	4.27	2.43, 7.54	4.05	2.24, 7.33
University degree	2.21	1.11, 4.40	2.23	1.11, 4.47	2.36	1.16, 4.82
Relative parental income, in deciles ^c	0.96	0.87, 1.06	0.95	0.86, 1.05	0.95	0.86, 1.07
Location of residence						
Rural	1.00	-	1.00	-	1.00	-
Urban	1.06	0.58, 1.93	1.03	0.56, 1.90	0.95	0.50, 1.80
White/European						
Nonwhite	1.00	-	1.00	-	1.00	-
White	1.32	0.69, 2.51	1.40	0.75, 2.63	1.80	0.90, 3.59
Immigrant						
Non-Immigrant	1.00	-	1.00	-	1.00	-
Immigrant	1.10	0.42, 2.89	0.95	0.37, 2.42	0.77	0.31, 1.91
Current smoker						
Nonsmoker	1.00	-	1.00	-	1.00	-
Smoker, daily or occasional	X	X	2.86	1.14, 7.15	2.71	1.04, 7.05
Missing smoking status	X	X	1.53	0.48, 4.91	1.51	0.46, 4.90
Supplement use						
No	1.00	-	1.00	-	1.00	-
Yes	0.74	0.41, 1.31	0.81	0.45, 1.48	0.87	0.47, 1.60
Weight status (measured)						
Not overweight/obese	1.00	-	1.00	-	1.00	-
Overweight/obese	0.88	0.49, 1.58	0.83	0.47, 1.49	0.79	0.43, 1.41
Underweight	X	X	1.15	0.22, 6.03	1.21	0.22, 6.58

Values represent odds ratios (OR) and 95% Confidence Intervals (CI) derived from simple and multivariable logistic regression models. Bold print indicates statistical significance ($p < 0.05$). Cells marked with an "X" are blanked due to minimum cell size requirements for releasing descriptive statistics from Statistics Canada.

^aIncludes children with a dietary recall occurring on a school day on the first or second day ($n = 2,991$ children). Data are weighted to the Canadian population.

^bAdjusted for children's sex, age, location of residence, ethnicity, immigration status, parental income, educational attainment, food security status, smoking status, supplement use, and child's weight status. A separate answer category (for respondents who did not provide an answer to the question, i.e. "missing") was created for the ethnicity, food security, smoking and weight status variables to avoid dropping these respondents in the multivariable linear regression models. Sample sizes for models vary slightly due to a small number of missing cases for the other covariates.

^cRelative parental income is based on the adjusted ratio of the respondent's total household income to the low-income cutoff corresponding to their household and community size. The relative parental income can take a value of one to ten and provides, for each respondent, a relative measure of their household income to the household incomes of all other respondents.

Despite the presence of the National School Lunch Program operating in most U.S. public schools,⁴² a U.S. study reported that between 7% to 17% of American children and adolescents, respectively, report missing lunch on any given school day.²⁴ In our study, the prevalence of Canadian children not eating lunch

on a given single day appears somewhat lower compared to U.S. estimates, where despite the availability of the national school lunch program, existing challenges have been widely documented pertaining to limited participation in and access to school lunch programming.⁴³ Given that the estimates from this study are based on only one 24-hour dietary recall, this study cannot assess the typical frequency or pattern of not eating lunch over longer stretches of time, such as over the course of a week or month. Such longer-term data would be needed to understand whether results found here represent only occasional cases of not eating lunch or are indicative of habitual absence of a mid-day meal at school. In a nationally representative sample of U.S. high school students, 38% of students reported not eating lunch on *at least* 1 day over a 7-day period.¹² As such, it is also likely that Canadian studies which collect intake across multiple days for each student are likely to identify higher prevalence of students not eating lunch at least occasionally. Additional studies are needed to examine to what extent estimates from one or two days of lunch data reflects typical daily or weekly, or long-term lunch consumption practices, and the broader family, school-level and policy drivers that impact access to and consumption of lunch at school.

Similar to findings from previous research,^{15,24} Canadian adolescents were more likely to miss lunch compared to younger children. However, unlike previous U.S. research, there were no significant associations with other socio-demographic variables such as parental income,²⁴ sex,^{12,24} ethnicity,^{12,24} or rural vs. urban residential location,⁴⁴ suggesting that not eating lunch in Canada is an issue that impacts students across income and racial/ethnic lines. The divergence from findings in other countries also affirms the need to collect and analyze Canadian-specific data where social, political, and school-food policy contexts can differ substantially from other national contexts including the U.S.

Our findings indicate that children living in a food insecure household were twice as likely to miss lunch compared to their peers living in more food secure households. Food insecurity is a condition that is typically accompanied by pervasive material deprivation, necessitating significant compromises to a family's household spending. This could in turn impact the ability of families to plan, purchase and prepare foods for school days⁴⁵ and may compound the 'time poverty' experienced by low income families.⁴⁶ Studies have also shown that children in food insecure families are aware of their family's limited food resources and are both physically and psychologically impacted by it.^{47,48} Data from the CCHS 2015 also suggest that children living in food insecure households have lower school hour dietary quality compared to their counterparts living in food secure households.⁴⁹ While it is possible that the patchwork of existing ad hoc meal programs across Canada are serving to buffer the experiences of some students from the most severe forms of food deprivation

at school, the CCHS did not include any questions on children's participation in a school meal program, precluding us to examine whether students are less likely to miss lunch if their school provides a school meal program.

In this Canadian sample, parental education but not relative income was associated with children's likelihood of not eating lunch. Yet, the associations bore out in an unexpected way, where parents with both the lowest and highest levels of educational attainment had children more likely to report not eating lunch than those with mid-level educational levels. Although these data cannot explain the mechanisms through which lower educational attainment impacts children's lunches, lower parental education might be associated with more precarious employment (e.g. shift work, long hours), and again, the increased 'time poverty' experienced by families.^{45,46} The lack of time and financial resources have been cited as barriers to healthy lunch-packing in a survey of elementary school parents in Ontario.⁴⁵ The finding that children whose parents had a university degree were also more likely to miss meals compared to their counterparts whose parents had a college/trades diploma was unexpected. This may potentially also be connected to the influence of employment status and time scarcity experienced by households working in full-time jobs and lacking time to plan and pack lunches on school days. Further qualitative inquiry is needed to elucidate the classed experiences of parents more fully across the socioeconomic spectrum and how educational experiences intersect with employment status, family structure, occupation, time scarcity, gender, marital status of parents and other axes of inequality potentially salient for teasing out the dynamics at play. The CCHS-Nutrition unfortunately did not collect data on parental employment, working conditions, stress or other school environmental variables such as the presence of school meal programs, adequate time or space for eating lunch, competing lunchtime activities with which to further probe the associations uncovered here.

Although food insecurity and parental education were significant predictors of not eating lunch, this study also reveals the complex interplay and potentially false assumptions about relations between social class and feeding children. Despite increased scrutiny faced by low income parents, particularly mothers, in regard to how they care for and feed their children,^{50,51} it is worth noting that no associations were found between not eating lunch and relative household income. The recent work of Elliott and Bowen⁵² also helps bring to light some of the challenges faced by low income mothers in feeding their children well, while facing increased scrutiny and potential stigmatization compared to higher income parents. There is evidence that poverty and social class may be used to unduly mark parents as uncaring, or overly permissive, or bad parents/mothers. The findings from this study serve to challenge potentially held false assumptions that poor parents in Canada are more likely to overlook feeding their

children than more affluent ones. In fact, these findings reveal that not eating lunch is an outcome that affects children across the socioeconomic spectrum.

In this study, smoking was associated with higher odds of not eating lunch among older youth. These findings are in line with previous Australian^{27,53} and Canadian studies^{54–56} which suggest that not eating meals is associated with other health-compromising behaviors such as smoking, lower levels of physical activity, and less desirable dieting behaviors. Cigarettes contain nicotine, an addictive substance, which has been reported to decrease appetite through the activation of the pro-opiomelanocortin neurons.⁵⁷ The association between smoking and missing lunch documented in the current study could be a result of the nicotine-induced addictive habit of replacing the lunch meal with a cigarette and the necessity of leaving school grounds to smoke as smoking is banned on the properties of most elementary and high schools in Canada.⁵⁸ However due to their appetite suppressing effect, it is also possible individuals use smoking as a strategy to compensate for a lack of food at lunchtime.

Strengths of this study included its large, nationally representative sample and use of dietary data that specifically queried consumption of the lunch meal over the course of a year. However, when considering these findings, some limitations should be acknowledged. First, analyses likely included some days when some children did not have school (e.g., professional development days for teachers) because the CCHS did not include a question asking respondents whether they were actually at school that day. However, the potential to include such days was limited by eliminating any reporting days which occurred on a Canadian national holiday or likely school break. Second, all data were collected by self-report and are subject to socially desirable response bias or other misreporting. Third, while the measure of population-level prevalence of lunch intake is a useful measure of a given single day's intake, this measure has not been validated for measuring habitual intake of lunch. Additional research is needed to understand when missing a lunch meal is typical or chronic for some student versus sporadic and how the frequency in missing occasional or frequent lunch meals impacts students' nutritional, social and academic outcomes. The Canadian literature is particularly short on qualitative insights that center on children's experiences and how they make meaning and connection from their school food experiences. Finally, it is worth noting that the CCHS excluded individuals living on Indian reserves and residents of remote regions of the country such as the Yukon, Northwest Territories and Nunavut. Given the much larger rates of household food insecurity in these regions,⁵⁹ it is reasonable to expect that estimates of not eating lunch would be higher if these regions were included.

Directions for Future Research

To understand the mechanisms underlying these results, additional qualitative and longitudinal studies are needed to examine the predictors and potential consequences of not eating lunch. The literature on Canadian children's school meal experiences and the context in which they eat lunch on school days is extremely limited and future research should capture a greater range of explanatory factors at the school-level which could influence lunch meal consumption, frequency and experiences (including for example how, when, where and by whom meals are provided at school, presence of a school canteen or other vending options, cooking facilities and/or a pleasant eating environment that may encourage youth to eat lunch, amount of time scheduled for the lunch break, and the availability and capacity of school staff to support children's food and emotional needs during lunch).⁶⁰ While the risk of not eating lunch disproportionally affects older students and those from food insecure households in Canada, these findings point to the need for continued research to better understand the intersecting barriers that shape children's access to nourishing meals during the school day and how lunch experiences shape nutritional, social and educational outcomes. Given that the CCHS 2015 did not target many individuals living on Indian reserves and remote rural regions not targeted by the CCHS, there is also a need to examine school lunch experiences in these communities. Such insights are vital for informing emerging strategies to improve access to nutritious food for all Canadian students.

Conclusions

In summary, being older, smoking, living in a household with the lowest and highest levels of educational attainment and experiencing food insecurity increases children's odds of reporting eating no lunch meal on school days. These findings suggest that not eating lunch in Canada is an issue that impacts students across income, education, and racial/ethnic lines.

Note

1. In Canada, the term college generally refers to post-secondary institutions focused on applied career preparation and offer courses that lead to certification in specific applied fields and trades. Universities typically offer undergraduate degrees and many also offer graduate degrees. Some colleges have Bachelor's degree in applied areas of study but typically they offer diplomas (2–3 year programs) and certificates (1-year programs).

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