

Low Family Income and the Overweight Status of Canadian Adolescents

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I. Motivation

In Canada, as in many other countries, the prevalence of overweight/obesity among children and youth has more than doubled over the past 25 years (Shields, 2005). Based on self-reports of height and weight, our data indicate that in 2005, 19.4 percent of Canadian girls aged 12 to 17 were over-weight and 3.5 percent were obese; 24.1 percent of Canadian boys the same age were over-weight and 6.1 percent were obese.

A variety of explanations for high levels of obesity among young people have been examined in the literature. These include: poor eating habits (e.g., Ball et al., 2008), lack of exercise and/or too much sedentary behaviour (e.g., Janssen et al., 2004), parental obesity and/or genetic factors (Lin, et al., 2004), and subjective social status (Adina et al., 2008). Other studies have also explored the role of low family income as a correlate of youth overweight status (e.g., O'Dea 2003 and 2008; Phipps, et al., 2005; Wang & Zhang, 2006) and it is upon this literature, in particular, that we build. In Canada, despite a unanimous vote in the House of Commons in 1989 to end child poverty by the year 2000, in fact, no progress has been made; 15.3 percent of children were poor in 1991 and this increased steadily to 16.8 percent were poor in 2004 (LIS Key Figures, 2009). Current high levels of unemployment in Canada are likely to mean further increases in child poverty. Thus, both child poverty and child obesity are problems; in this chapter we explore connections between the two.

Our goal is, first, to estimate the relationship between obesity and low family income for Canadian teens. Second, we want to examine potential pathways for this relationship: in particular, we focus on the teen's level of physical activity, his or her eating habits and family food security, hours spent in paid work, and 'sense of belonging to the local community.'

II. Data

We use Cycle 3.1 of the Canada Community Health Survey, a very large cross-sectional survey carried out by Statistics Canada in 2006, representative of the non-institutionalized Canadian population aged 12 and over. Interviews were carried out using computer-assisted interviewing technology by trained Statistics Canada staff (approximately half of the interviews were in person with the remainder done over the phone). One knowledgeable member of the household was asked to provide basic demographic information about the household (including parental education levels and family income). Then, one member of each sampled household was randomly selected for the more in-depth interview. When children aged 12 through 15 were selected as respondents to the CCHS, interviewers were obliged to obtain permission from parents/guardians, but child interviews were only carried out if the privacy of the child's responses could be guaranteed (i.e., parents were not able to see the child's responses). Adolescents not living with a parent or parents were excluded from our analysis (about 10 percent of available observations).

CCHS respondents self report height and weight. Other studies indicate that adolescent self reports correlate well with measured height and weight, though it is likely we under-estimate overweight and obesity prevalence with these data (Elgar et al., 2005). Of the 12,317 adolescents aged 12 through 17 who are respondents to Cycle 3.1 of the CCHS, 11,350 (92%) responded to the height/weight questions necessary to construct BMI (weight/height²). Overweight and obesity status are identified by comparing the adolescent's BMI with the age/sex cut points derived using data from six countries by Cole et al. (2000). Essentially, these cut-offs define a child as overweight/obese if his or her current BMI is on a growth path that will lead to overweight/obesity in adulthood.

Respondents with missing data for any analysis variable were excluded. Notably, 2692 observations were lost due to missing family income. Following exclusions for non-response to other questions used in our analysis, we have a sample of 3191 girls and 3422 boys.

III. Methods

We estimate logit models of the probability of being overweight or obese. Models are estimated separately for boys and girls. In the first specification we include only an indicator that the child lives in a family with income in the bottom 20 percent of the Canadian income distribution.¹

In the second specification, we add explanatory variables that may serve as pathways from low family income to child obesity. In each case, it seems plausible that the variable may both correlate with family income and be a factor in understanding teen overweight status.

The first set of additional explanatory variables describe the teen: age (15 to 17 versus to 12 to 14), immigrant status, ethnicity (non-white). Immigrant families may both have lower income (Picot, 2004) and different cultural practices that correlate (positively or negatively) with child overweight status; similarly, adolescents with different ethnic backgrounds may have different body types, body images and or eating habits which may correlate with overweight status (see, for example, ODea, 2008).²

A second set of explanatory variables describe the family environment: lone-parent versus two-parent family, highest education level achieved by a parent, region of residence. Lone parents may both be less able to afford and have less time to cook healthy foods or to drive teens to recreational activities. Also, lone parents experience higher levels of stress (Burton and Phipps, 2009) which can increase cravings for high fat/high sugar foods (e.g., Rosmond, 2005). If unhealthy foods are available in the home, they will also be accessible to the children. Parents with higher levels of education can be expected to have more secure jobs and higher incomes; they may also have more knowledge of nutrition and healthy living practices.³

A third set of variables describe behaviour, restrictions on behaviour (physical activity, activity limitations, daily intake of fruits/vegetables) and/or feelings of the young teen (self-assessed sense of 'belonging to the local community') that may be connected with family low income.

¹ We have experimented with using national income deciles, with including all five quintile and with including simply a measure of (the log of) family income. In all cases, we find the same pattern of results, so choose to focus on the most parsimonious specification to simplify presentation.

² Indeed, some recent research points out that the connection between socioeconomic status and obesity might differ by ethnicity (e.g., Wang and Zhang, 2006).

³ In past work (Phipps et al., 2006), we found, for younger children, a correlation between maternal paid work hours and the overweight status of children aged 6 to 11. A weakness of the CCHS is that we are unable to control for parental paid hours in this study.

It is plausible that lower-income teens have fewer opportunities to be physically active than their more affluent peers. For example, families may not be able to afford to pay for involvement in sports or recreation; lower-income neighbourhoods may offer fewer parks or facilities or not feel safe (see Oliver and Hayes, 2005). We measure each teen's level of physical activity according to their 'daily energy expenditure.' This is constructed for each respondent in the CCHS from information collected about types of physical activities and amount of time spent in each. Different forms of physical activities are more energy-consuming than others (e.g., hockey versus fishing); thus, for each activity in which the teen participated, Statistics Canada multiplies frequency X duration X estimated kilocalories expended per kilogram of body weight for that activity, assuming a low intensity level (see Statistics Canada, 2006b, p. 102). These are summed across all activities and divided by 365 to obtain estimated daily energy expenditure.

Many teens with activity limitations may be unable to engage in a healthy, active life-style, increasing the chances of being overweight relative to their peers. To the extent that the activity limitation imposes a financial burden on the family (e.g., through reduced labour market participation of a parent), activity limitations may be more prevalent in lower-income families.

Eating more fruit and vegetables is recommended as part of a healthy life-style, but may be less affordable for lower-income families, particularly in more isolated regions and during Canadian winters when fresh fruit and vegetables may be more expensive than other foods. Since only four provinces (PEI, Ontario, Alberta and BC) participated in the nutrition sub-module, we provide separate estimates to investigate diet as a pathway from low-income to child overweight status.

Another way to approach understanding a potential link between low income and poor nutrition is through a rich set of food security questions answered by respondents to the CCHS. This is, again, a sub-module of the survey and four provinces (Newfoundland, New Brunswick, Saskatchewan and Manitoba) did not participate. The question we use here is: "You and other household members couldn't afford to eat balanced meals. In the past twelve months was that often true, sometimes true, or never true." From this information, we construct a 'food insecurity' variable =1 if the respondent answered

'often' or 'sometimes.' Note that food insecurity is not the same thing as low income insofar as it will also reflect prices and availability of healthy food in the local area.

An issue that has not received much attention in the literature on adolescent obesity is that lower-income teens seem plausibly more likely to take on paid jobs. If paid hours are high, this has the potential to limit time available for a physically active life-style (though some jobs will involve physical labour). Also, many teens work at fast-food establishments that may encourage them to eat unhealthy foods (e.g., Thompson et al., demonstrate longitudinal increases in bmi for adolescent girls who purchase more food away from home). Although we do not know the nature of the paid work done, the CCHS asks 15 to 17 year olds about usual paid hours per week.

In a third set of regressions, we include a variable describing the adolescent's self-assessed sense of 'belonging.' In Europe, both scholars and policy makers are increasingly focused on 'social exclusion' rather than simply on poverty as an important policy problem (see, for example, Micklewright, 2002). While low income, especially long-term low income is viewed as an important component of social exclusion (e.g., Atkinson, 1998), social exclusion is a broader concept than poverty. For example, a child with a disability or a child who is a new immigrant might feel socially excluded though he or she might not live in low-income; nevertheless, living in low income is likely to generate feelings of exclusion (if, for example, the teen is unable to afford clothing similar to peers, to participate in school trips or to have a cell phone on which to text message). In a recent paper, Adina et al., (2008) provide evidence that girls who feel less popular are more likely to gain weight. Although we have no information about feelings of popularity, in the CCHS, all respondents are asked: "How would you describe your sense of belonging to your local community? Would you say it is: very strong, somewhat strong, somewhat weak, very weak?" We include an indicator that the child feels less than a 'very strong' sense of belonging to his or her local community as an indicator of potential 'social exclusion.' We add this variable separately given that it is plausibly endogenous (direction of causation could run from being overweight to feeling you don't belong or from feeling you don't belong to becoming overweight).

All reported estimates use cross-sectional survey weights. Estimation was carried using the software package STATA.

IV. Descriptive Statistics

Are Low-Income Adolescents More Likely to be Overweight?

Figure 1 indicates that Canadian teens from lower-income families are, unconditionally, more likely to be overweight than children from moderate or higher-income families. While boys are more likely to be overweight than the girls, the association between low family income and overweight status is somewhat more pronounced for the girls. Figure 2 presents the same profiles for obesity; very similar patterns are evident, with the low-income association particularly strong for the girls.

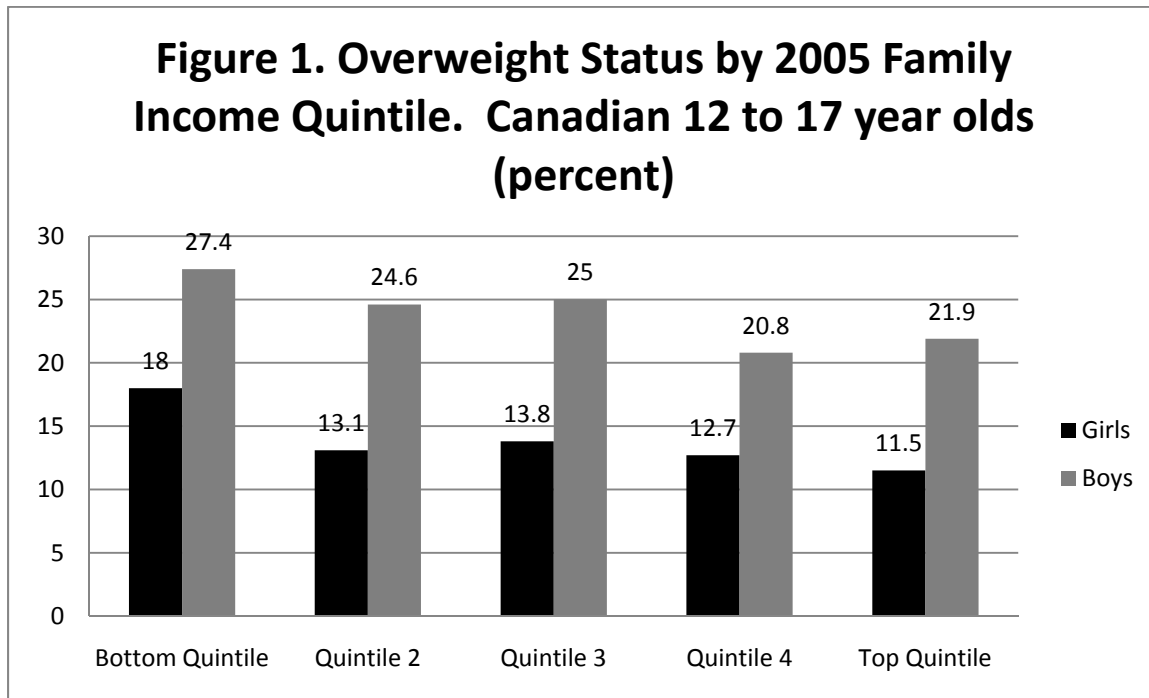
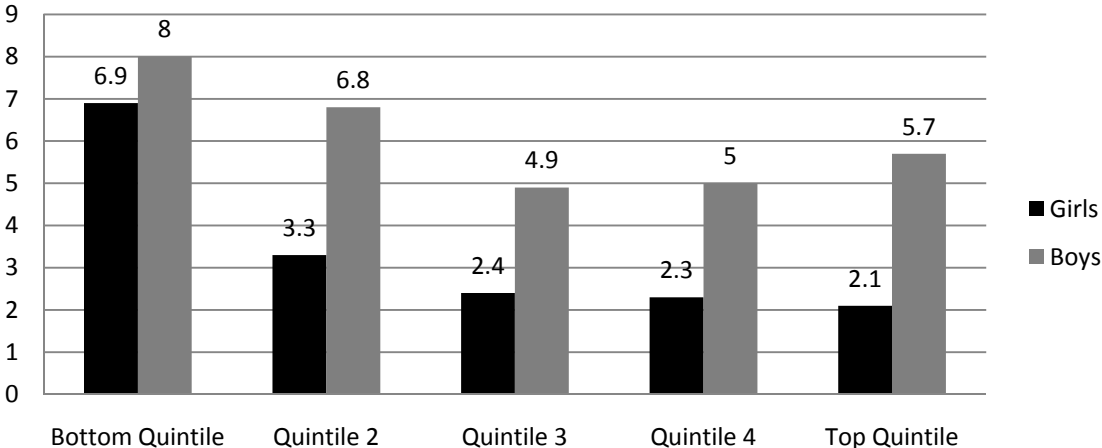
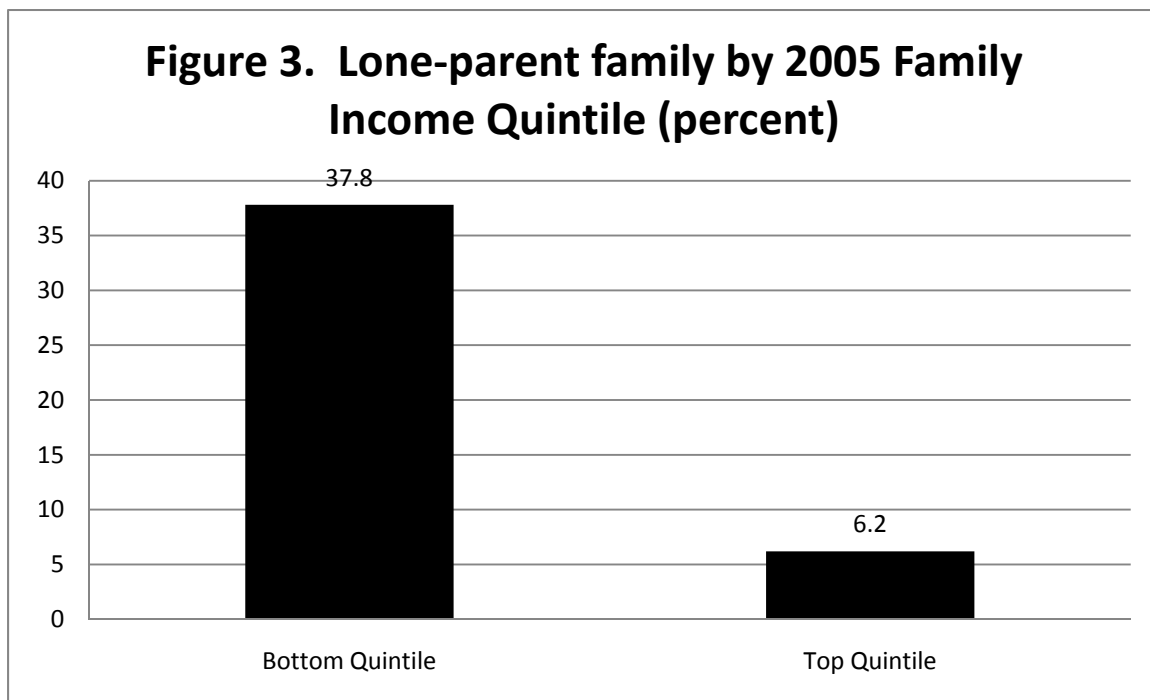


Figure 2. Percent Obese by 2005 Family Income Quintile. Canadian 12 to 17 year olds.

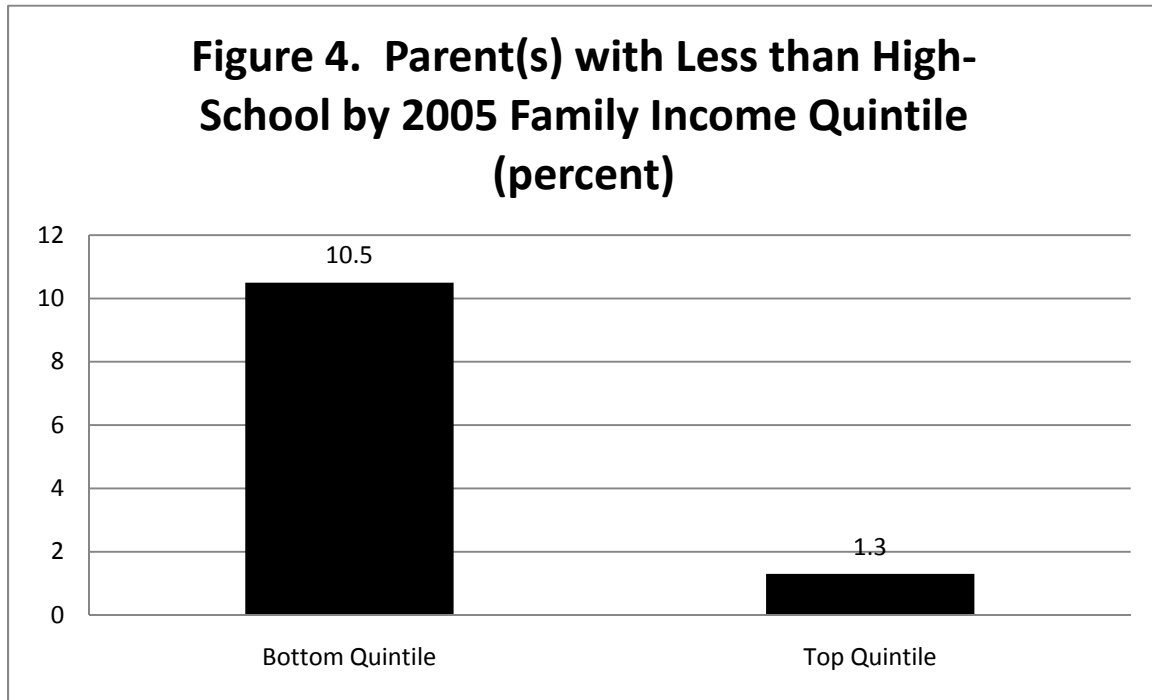


How are Children from Low-Income Families Different?

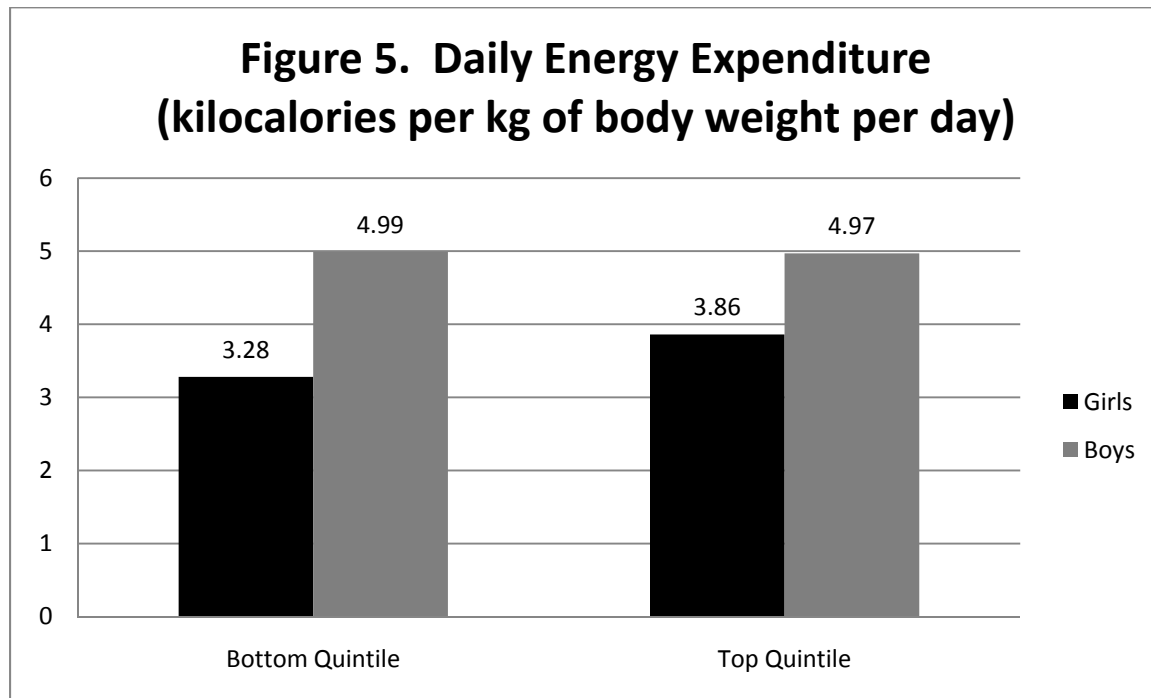
We next illustrate the connection with low-income status for a selected set of variables that might serve as pathways from low income to higher levels of overweight for Canadian adolescents. Notice, first, in Figure 3, that 37.8 percent of teens in the bottom quintile of the Canadian income distribution live in lone-parent families compared to just 6.2 percent in the top quintile.



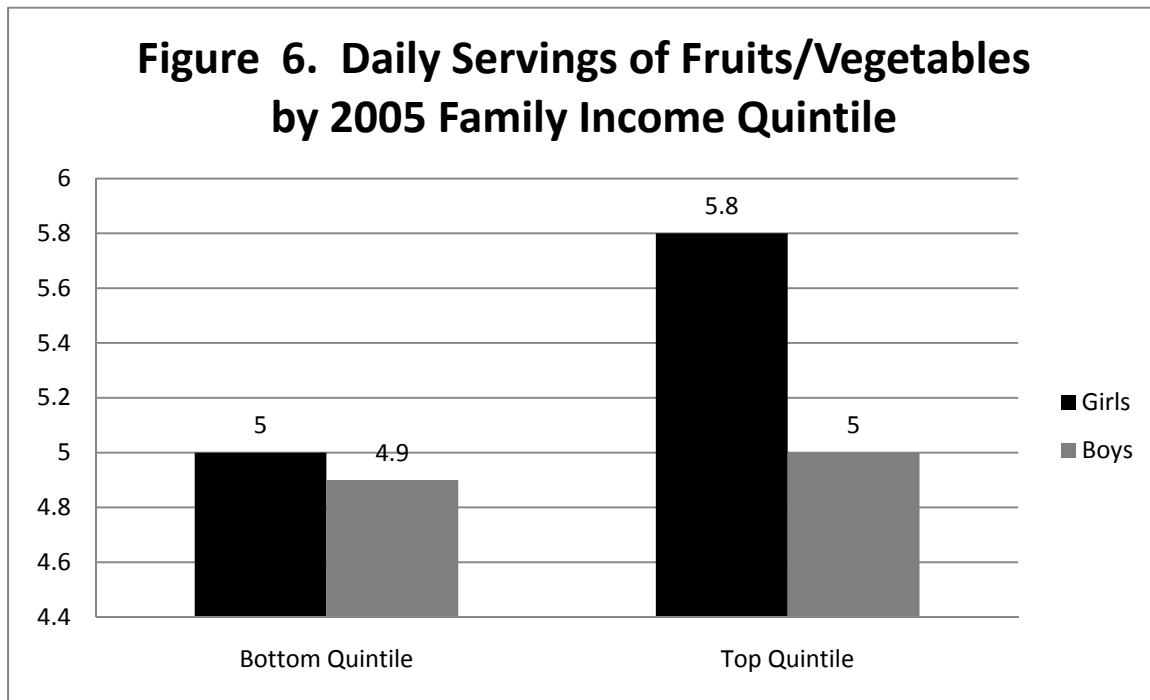
As indicated in Figure 4, bottom-quintile children are also more likely to have a parent with a low education.



In terms of teen behaviour, Figure 5 shows that girls in lower-income families are somewhat less active than girls from higher-income families. Boys are, on average, more active than girls, but there is no apparent socioeconomic pattern evident.

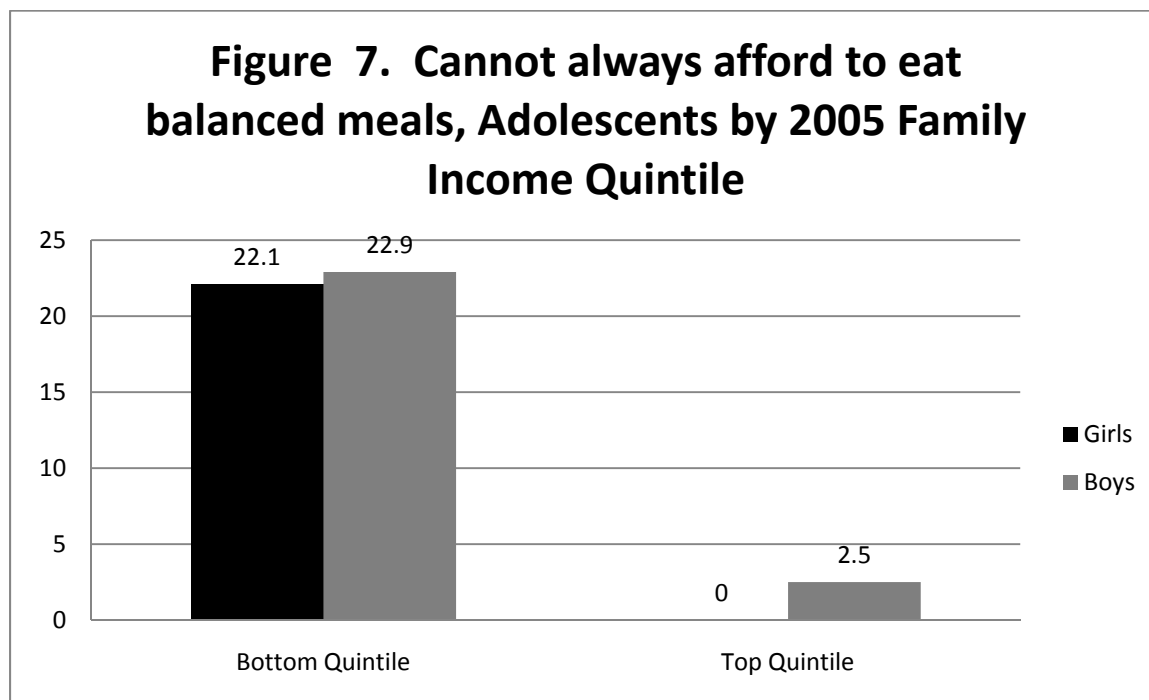


Although boys are more active, girls are more likely to eat their vegetables,⁴ especially if they are from higher income families (see Figure 6).



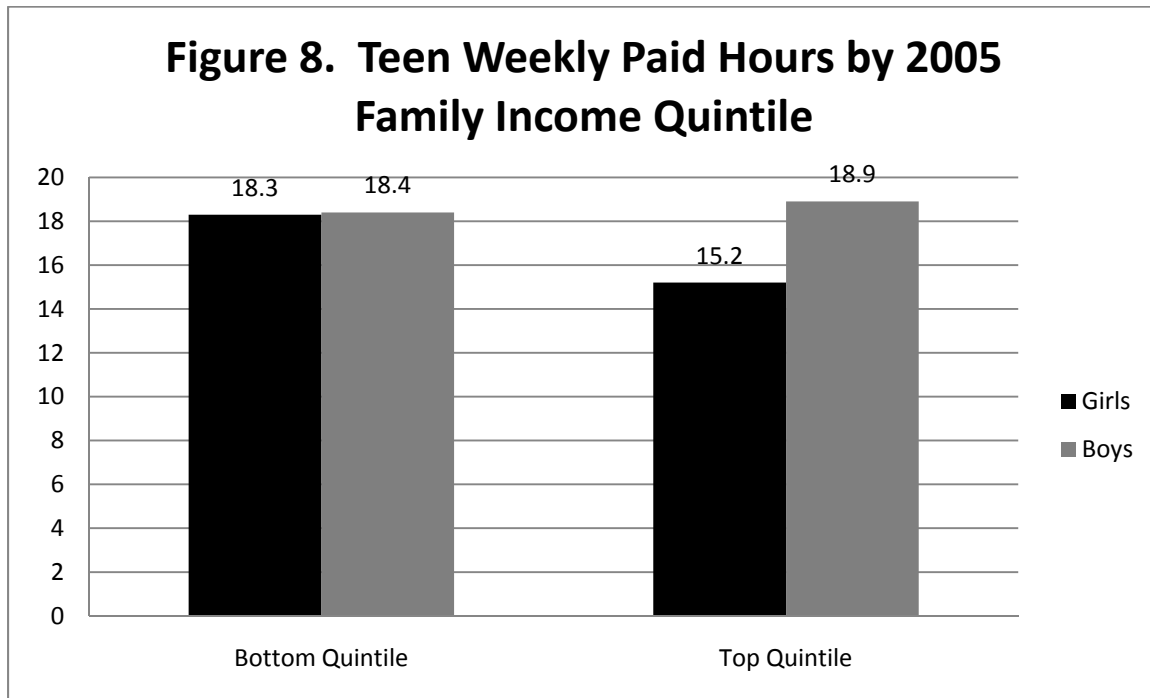
⁴ These data are from a sub-set of 4 provinces rather than the full Canadian sample.

More generally, Figure 7 illustrates a link between low income and nutrition insofar as about 22 percent of adolescents in the bottom quintile of the Canadian income distribution report that their families cannot always afford a balanced diet⁵; food scarcity basically does not exist for children in the top quintile.

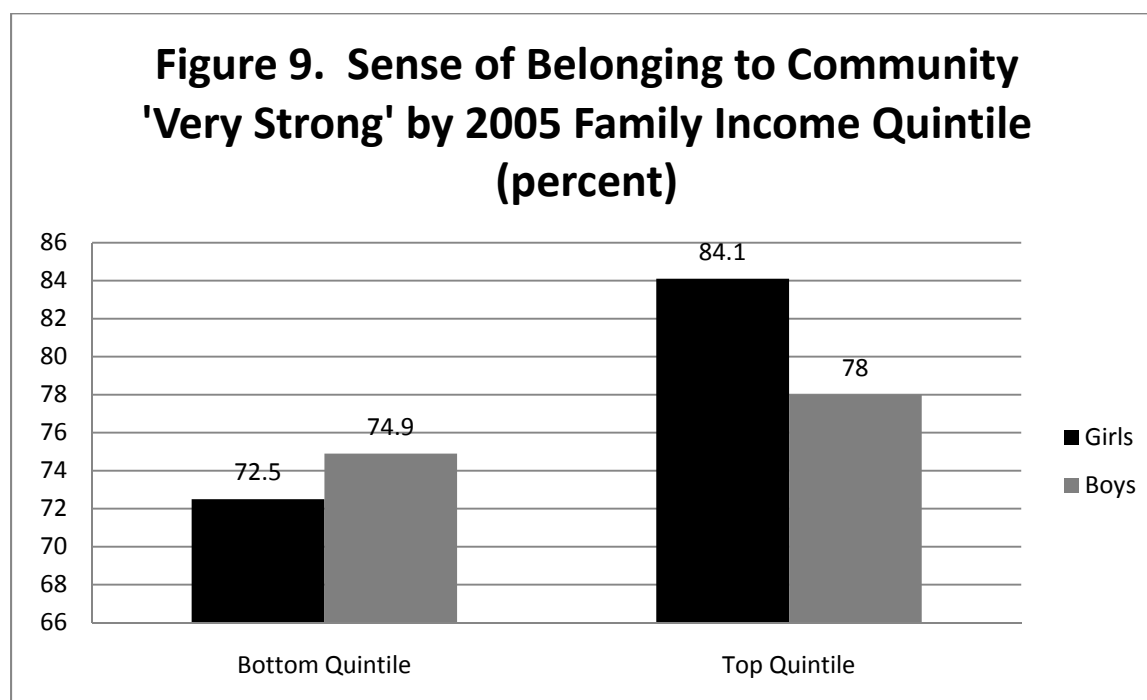


⁵ These data make use of a sub-module of the CCHS in which 5 provinces participated (PEI, Nova Scotia, Quebec, Ontario, Alberta and BC).

While it seems plausible that teens from lower-income families may be more likely to take up part-time jobs in order to supplement family income, Figure 8 illustrates that there is no apparent difference in hours of paid work performed by 15 to 17 year old boys in high and low-income families (averages include zeroes). There are, however, differences in participation in paid work by family income level for 15 to 17 year old girls. In particular, girls from families with income in the top 20 percent of the Canadian income distribution on average work fewer hours per week (15.2 compared to 18.3 for lower income girls).



Finally, Figure 9 illustrates that both boys and girls from lower-income families are less likely to feel a strong sense of belonging to their community, with this pattern again more striking for the girls.



Multivariate Results

Tables 1 and 2 report odds ratios from estimated logit models of the probability of being overweight or obese, respectively. For girls, specification A in Table 1 confirms a statistically significant relationship between overweight status and family income; girls from lower-income families are about 1.5 times more likely to be overweight than girls from middle or higher-income families. The relationship between family income and overweight status is not statistically significant for boys.⁶ Table 2 indicates an even larger association between low family income and the probability of obesity for teen girls; again, there is not a statistically significant relationship for teen boys. Finding that low income is correlated with obesity for adolescent girls but not boys is consistent with literature from other countries (for example, O'Dea, 2008 for Australia, Wang and Zhang, 2006 for the US).

⁶ In pooled boy/girl models, girls are significantly less likely than the boys to be either obese or overweight.

Pathways from Low-Income to Overweight Status?

We next explore possible pathways from low income to overweight/obese status by re-estimating logit models for the probability that the teen is overweight/obese, adding the covariates described above (with the exception of 'belonging'). Means for all explanatory variables are reported in Appendix Table 1. Odds ratios are reported in Specifications B in Tables 1 and 2.

For girls, living in a lone-parent family, having a parent (or parents) with low education, living in the Atlantic and having an activity limitation⁷ are all potential pathways through which low-income is associated with overweight status. Girls living in lone-parent families have higher odds of being overweight (odds ratio = 1.33); girls whose parents have not completed high school are almost twice as likely to be overweight as girls whose parents have high school diplomas (odds ratio= 1.90); girls living in Atlantic Canada are also much more likely to be overweight than girls in Ontario, all else equal (odds ratio = 1.60). The size of the low-income indicator itself falls in size and is no longer statistically significant after these pathway variables are added to the model. Physical activity (as measured through daily energy expenditure) does not have a statistically significant association with the probability of being overweight for adolescent girls.

Table 2 indicates that the association between low family income and obesity remains very large and highly statistically significant even after inclusion of the full additional set of covariates. Notice that, for girls, being non-white is associated with 50 percent lower odds of being obese.

For adolescents living in 4 Canadian provinces (PEI, Ontario, Alberta and BC), the CCHS provides data about daily consumption of fruits and vegetables. This measure of nutrition does not have a statistically significant relationship with overweight status for Canadian teen girls. (Since we are working with a sub-sample of the data, we report selected odds ratios separately in Table 3.) Janssen et al., 2004 also found no relationship between dietary habits and overweight status, though they did find significant associations for inactivity which, for girls, we do not.

If, however, we make use of the teen's report that the family could not always afford a balanced diet, there is, other things equal, a strong association with both overweight and obese status for the girls.

⁷ Morbid obesity could in itself be an activity limitation.

Since this information is only available for teens living in PEI, Nova Scotia, Ontario, Alberta and BC, selected results are, again, reported separately in Table 4.

Contrary to our expectations, 15 to 17 year old girls with part-time jobs (between 10 and 19 hours) are much less likely to be obese than those without part-time work (odds ratio = 0.46; see Table 5).⁸ However, a sizable positive (though not statistically significant) association between obesity and high paid hours (more than 20 per week) is apparent, suggesting future research on this issue might be warranted.

Specification C in Table 1 adds the indicator that the teen feels a 'very strong' sense of belonging to her local community. For girls, the probability of being overweight is lower (odds ratio =0.68) when belonging is very strong. Although clearly this is an important relationship, with cross-sectional data, we are not able to say anything about the direction of causation. O'Dea (2008), for example, finds a relative decline in close friendship scores for girls with high BMI; Adina et al. (2008) find that girls who feel less popular are more likely to gain weight.

For boys, the estimated association between family low-income and the probability of being overweight is smaller and remains statistically insignificant following the inclusion of the set of potential pathway variables (see Specification B in Table 1). As was also true for the girls, parental education has an important association with the probability a teen boy is overweight – if a parent has post-secondary level education the probability that a teen boy will be overweight is only 70 percent as high as if the highest level of education in the family is high-school. Activity limitation again has strong positive associations with the probability of being overweight with the size of the association very similar to that estimated for teen girls. One factor that correlates significantly with overweight/obese status for the boys that did not play a role for the girls is exercise. Boys who expend more energy daily are significantly less likely to be overweight. Care should be taken in the interpretation of the odds ratios in this case; they indicate the relative odds of being overweight or obese per kcal of energy expended per day per kg of body weight. For instance, boys who spend an additional hour per day at activities such as bicycling, skating, golfing, skiing or tennis (which expend approximately 4 kcal/kg of weight) have a probability of being overweight that is 92 percent (i.e., 0.98⁴) and a probability of being obese that is between 82 (i.e., 0.95⁴) of those who do not have this additional hour of exercise (using Specification B).

⁸ A possible interpretation of this correlation is that overweight girls are less likely to be hired?

Neither fruit and vegetable consumption (see Table 3) nor family food insecurity (see Table 4) have statistically significant associations with overweight/obese status for the boys. However, as indicated in Table 5, part-time work (10 to 19 hours per week) is associated with a lower probability of being obese (odds ratio = 0.48) for the 15 to 17 year old boys as well as for the girls.

In contrast with results for adolescent girls, no statistically significant association between feeling a strong sense of belonging and overweight status is apparent for boys (see Specifications C in Tables 1 and 2).

To sum up, for Canadian adolescent girls, we find a strong association between family income and overweight and, especially, obese status; the same relationship is not apparent for Canadian adolescent boys. Important pathways from family income to overweight status include: parental education, family structure, family food security and the teen's sense of belonging to the local community.

V. Discussion/Conclusions

This paper uses a sample of adolescents aged 12 to 17 years selected from a large survey representative of the Canadian population (the Canada Community Health Survey (CCHS) to study the association between family income and adolescent overweight/obesity. Adolescents themselves provide answers to the survey, except for basic information about the household (including income and parental education) which is provided by parents. Advantages of the CCHS for our purposes, in addition to its size, are that we have detailed data about physical activity, about consumption of fruits/vegetables, family food security and the teen's self-assessed feeling of belonging to the local community. Limitations are that the CCHS is cross-sectional and, for the full sample, provides only self-reported height and weight.

Echoing results reported for Australia (O'Dea, 2008) and the US (Wang and Zhang, 2006), we find that lower income girls are more likely to be overweight/obese than middle or higher-income girls, but that no statistically significant income gradient is apparent for the boys. Moreover, for the boys, no income-related patterns are evident in behaviours that past research has suggested should matter for obese/overweight status (e.g., physical activity, consumption of fruits/vegetables). Nor is such a pattern apparent in the paid work patterns of Canadian adolescent boys, a new potential avenue we consider

here (but which perhaps warrants future research that distinguishes the type of paid work done – e.g., working in a fast-food restaurant versus mowing lawns).

For girls, on the other hand, not only is low income correlated with overweight/obese status, but it is also true that girls are less active, do more paid work and eat fewer servings of fruits/vegetables when they come from lower-income families. Understanding why these underlying behaviours exhibit income-related patterns for girls but not for boys would be a useful direction for future studies. For example, it could be the case that girls from lower-income families are asked to do more childcare or housework, leaving them less time to be physically active. Preliminary calculations using time use data from the 2005 Statistics Canada General Social Survey indicate that, indeed, lower-income girls do considerably more unpaid work than other Canadian adolescents (e.g., 11.6 hours of housework and childcare per week compared to 4.8 hours for high-income girls; boys do about 6 hours per week regardless of family income).

For both boys and girls, we find that lower-income adolescents are less likely to feel a strong sense of belonging to their local communities, though the difference by family income is much larger for the girls than the boys. We further find that girls who lack a sense of belonging are more likely to be overweight; future research with longitudinal data might usefully probe the direction of causation here.

In terms of preventing childhood obesity, the topic of this book, these results are a reminder that reducing the number of children who live in poverty could help reduce the number of children who are overweight or obese. More children would be able to afford a balanced diet, more children would be able to participate in healthy recreational activities, fewer children would feel excluded.

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Table 1. Odds Ratios for Logit Models of the Association Between Low Family Income and the Probability of Overweight Status. Canadian 12 to 17 year olds.

	Girls			Boys		
	A	B	C	A	B	C
Low Income	1.48** (0.24)	1.22 (0.23)	1.20 (0.23)	1.24 (0.18)	1.01 (0.16)	1.01 (0.16)
Age 15 to 17		1.08 (0.14)	1.01 (0.14)		0.95 (0.10)	0.92 (0.10)
Non-white		0.97 (0.17)	0.95 (0.17)		1.29 (0.21)	1.27 (0.20)
Immigrant		1.17 (0.38)	1.14 (0.36)		1.16 (0.29)	1.16 (0.29)
Lone-parent family		1.33* (0.22)	1.29 (0.22)		1.13 (0.17)	1.12 (0.17)
Highest parental education less than high school		1.90** (56)	1.88** (0.56)		1.03 (0.28)	1.03 (0.28)
Highest parental education post-secondary		0.93 (0.16)	0.91 (0.15)		0.70** (0.11)	0.70** (0.11)
Atlantic		1.69*** (0.32)	1.73*** (0.33)		1.32* (0.21)	1.32* (0.21)
Quebec		0.93 (0.19)	0.91 (0.18)		0.85 (0.14)	0.84 (0.13)
West		1.10 (0.17)	1.09 (0.17)		0.89 (0.12)	0.89 (0.12)
Activity Limited		1.35*** (0.21)	1.33** (0.21)		1.44*** (0.19)	1.43*** (0.19)
Daily Energy Expenditure		0.98 (0.02)	0.98 (0.02)		0.98* (0.01)	0.98* (0.09)
Belonging to Community 'Very Strong'			0.68** (0.12)			0.87 (0.12)
Number of Obs	3191	3191	3191	3422	3422	3422

Table 2. Odds Ratios for Logit Models of the Association Between Low Family Income and the Probability of Being Obese. Canadian 12 to 17 year olds.

	Girls			Boys		
	A	B	C	A	B	C
Quintile 1	2.82*** (0.83)	2.75*** (1.03)	2.70*** (1.0)	1.47 (0.40)	1.14 (0.32)	1.16 (0.32)
Age 15 to 17		1.65* (0.46)	1.55 (0.42)		1.20 (0.23)	1.14 (0.21)
Non-white		0.50* (0.18)	0.49* (0.18)		1.40 (0.37)	1.36 (0.35)
Immigrant		0.95 (0.70)	0.94 (0.69)		0.99 (0.45)	0.99 (0.44)
Lone-parent family		0.96 (0.30)	0.94 (0.30)		1.40 (0.37)	1.39 (0.36)
Highest parental education less than high school		1.07 (0.58)	1.04 (0.57)		0.85 (0.37)	0.83 (0.36)
Highest parental education post-secondary		0.85 (0.28)	0.82 (0.27)		0.72 (0.18)	0.72 (0.18)
Atlantic		1.43 (0.51)	1.45 (0.52)		0.86 (0.24)	0.87 (0.25)
Quebec		0.99 (0.39)	0.97 (0.39)		0.61 (0.17)	0.60* (0.17)
West		1.04 (0.33)	1.03 (0.33)		0.87 (0.20)	0.88 (0.20)
Activity Limited		2.89*** (0.84)	2.82*** (0.80)		1.61** (0.36)	1.60** (0.37)
Daily Energy Expenditure		0.94 (0.07)	0.94 (0.07)		0.95* (0.02)	0.96* (0.03)
Belonging to Community 'Very Strong'			0.71 (0.24)			0.71 (0.18)
Number of Obs	3171	3171	3171	3393	3393	3393

Table 3. Selected Odds Ratios for Logit Models of the Association Between Daily Consumption of Fruits/Vegetables, Low Family Income and the Probability of Being Overweight/Obese. 12 to 17 year olds living in PEI, Ontario, Alberta and BC.

	Girls		Boys	
	Obese	Overweight	Obese	Overweight
Low Income	2.48* (1.20)	1.08 (0.76)	1.13 (0.43)	0.88 (0.20)
Daily Servings of Fruits/Vegetables	0.99 (0.08)	0.96 (0.04)	1.03 (0.06)	0.98 (0.03)
Number of Obs	1689	1689	1881	1881

Additional controls = daily energy expenditure, child age, ethnicity, immigrant status, activity limitation, lone-parent family, highest parental education level, region, strong feeling of belonging to local community

Table 4. Selected Odds Ratios for Logit Models of the Association Between Food Insecurity, Low Family Income and the Probability of Being Overweight/Obese. 12 to 17 year olds living in PEI, Nova Scotia, Ontario, Alberta and BC.

	Girls		Boys	
	Obese	Overweight	Obese	Overweight
Low Income	2.17* (1.01)	1.10 (0.25)	1.22 (0.32)	0.93 (0.16)
Food insecure	3.31** (1.56)	1.73* (0.49)	1.60 (0.88)	1.50 (0.39)
Number of Obs	2566	2566	2814	2814

Additional controls = daily energy expenditure, child age, ethnicity, immigrant status, activity limitation, lone-parent family, highest parental education level, region, strong feeling of belonging to local community

Table 5. Selected Odds Ratios for Logit Models of the Association Between Paid Work, Low Family Income and the Probability of Being Overweight/Obese. 15 to 17 year olds.

	Girls		Boys	
	Obese	Overweight	Obese	Overweight
Low Income	3.92*** (1.76)	1.25 (0.22)	1.25 (0.49)	1.06 (0.22)
1 to 9 paid hours per week	0.76 (0.42)	0.90 (0.26)	0.43 (0.23)	0.70 (0.22)
10 to 19 paid hours per week	0.46* (0.20)	0.95 (0.24)	0.48* (0.19)	0.80 (0.18)
20+ paid hours per week	1.38 (0.66)	1.21 (0.37)	1.05 (0.49)	0.86 (0.20)
Not in school	0.27** (0.18)	0.46** (0.15)	0.79 (0.36)	0.85 (0.23)
Number of Obs	1580	1580	1651	1651

Base category for paid work hours is no paid hours. Additional controls = daily energy expenditure, child age, ethnicity, immigrant status, activity limitation, lone-parent family, highest parental education level, region, strong feeling of belonging to local community

Appendix Table 1. Means of Explanatory Variables used in Logit Regressions.

	Girls	Boys
Low Family Income (Bottom Quintile of Canadian Income Distribution) (%)	22.3	19.8
Child Age 15 to 17 (%)	52.2	50.2
Child non-white (%)	16.2	17.3
Child an immigrant (%)	8.1	9.2
Highest parental education less than high school (%)	3.3	4.3
Highest parental education post-secondary diploma or degree (%)	80.2	78.1
Atlantic (%)	8.0	7.8
Quebec (%)	23.8	22.4
West (%)	27.7	28.0
Child has activity limitation (%)	18.7	17.2
Daily Energy Expenditure (kcal/kg/day)	3.43 (3.19)	4.76 (4.34)
Child feels a 'very strong' sense of belonging to local community (%)	78.2	77.3
Number of observations	3191	3422
Nutrition Sub-Module (sub-sample from PEI, Ontario, Alberta and BC only)		
Daily servings of fruits/vegetables	5.39 (2.67)	5.17 (2.96)
Number of observations	1689	1881
Food Security Sub-Module (sub-sample from NS, PEI, QC, ON, AB, BC)		
Family sometimes/often could not afford a balanced diet (%)	6.9	6.2
Number of observations	2566	2814
Paid Work Sub-Module (sub-sample of 15 to 17 year old youth)		
No paid hours (%)	52.1	57.3
0 to 9 hours per week (%)	12.0	9.8
10 to 19 hours per week (%)	25.2	20.1
20+ hours per week (%)	10.7	12.8
Not in school (%)	6.7	6.9
Number of observations	1580	1651