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Short Communication

Exploring the association between food insecurity and food skills among school-aged children

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Abstract

Objective: To examine the relationship between household food insecurity (FI) and children's involvement in family meal choices and food preparation, used as proxies for children's food skills, and to explore gender differences within these associations.

Design: Households were classified as food-secure or food-insecure using the six-item, short-form Household Food Security Survey Module. Children's involvement in family meal choices and food preparation were treated as proxies for children's food skills. Mixed-effects multinomial logistic regression models were used.

Setting: Public schools in Nova Scotia, Canada.

Participants: 5244 children in the fifth grade (10–11 years old) participating in the Children's Lifestyle and School Performance Study (CLASS).

Results: Most children reported being involved in family meal choices or food preparation at least weekly (74 and 68 %). The likelihood of helping choose family meals once a week was 33 % lower among girls from food-insecure households compared to girls from food-secure households. No differences in boys' involvement in family meal choices were observed according to household FI status. Boys from food-insecure households were 65 % more likely than boys from food-secure households to assist with food preparation/cooking four times per week. No differences in girls' involvement in food preparation were observed according to household FI status.

Conclusions: Findings support that household FI is not due to a lack of food skills but most likely due to inadequate access to resources. This supports the call for upstream policies targeting the structural issues underpinning household FI such as low income.

Keywords
Food security
Food literacy
Food skills
Children
Canada

In Canada, as in the United States, food (in)security is defined at the household level. Food security (FS) exists when 'all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'[1]. Food insecurity (FI) happens when at least one of the conditions for FS is not met[1,2]. FI is a serious public health concern in Canada, with the latest pan-Canadian data from 2015 to 2016 reporting a 12 % prevalence of household FI[3]. Yet, certain population groups, such as children, are more susceptible to FI than others – one in six children (15·6 %) is affected by household FI. FI is an important social determinant of health which has been consistently associated with poor physical and mental health outcomes[4–9]. Among children living in Canada, a wealthy country, household FI has been associated with poor diet quality[8], lower height (including stunting)[10,11], higher BMI[8,10], and socioemotional, cognitive and academic

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difficulties[8,12–14]. Household FI appears to influence children's physical and mental health via both diet and overall family stress or functioning[12,15–17], with some differences found between genders[9,10,18,19].

Another important health determinant, food skills, an attribute of food literacy, includes the possession of knowledge and skills to select and prepare foods from all food groups using commonly available kitchen equipment[20–22]. Better food skills support dietary resilience over time and may protect against excess body weight and nutrition-related chronic diseases[20,22]. A lack of food skills is, therefore, seen as a barrier to healthy food choices[23,24]. To overcome this barrier and improve food skills among children, school programmes focusing on enhancing food skills have been developed[25–27]. Such programmes have resulted in increased vegetable and fruit consumption, positive lifestyle changes, increased knowledge and improved attitude towards healthy eating among children[25–28]. Similarly, children's involvement in family food preparation has been associated with higher preference for, and intake of, vegetables and fruit[29,30], self-efficacy for both healthy eating[29] and cooking[31] and improved diet quality[30,32–34].

There is a pervasive perception among community workers, policymakers, governments and the general population that poor food skills contribute to FI[35–37]. This is reflected in the proliferation of community cooking and gardening programmes that have been portrayed as interventions that will enhance FS[35,37–39]. However, no association of impaired food skills with FI among adults appears to exist[40,41]. For school-aged children, there is a paucity of data and evidence. This is also lacking regarding whether this association is affected by child's gender. Therefore, the aim of this paper was to examine the relationship between household FI and fifth-grade school children's involvement in family meal choices and food preparation, used as proxies for children's food skills[42]. The research questions were: (i) Is household FI associated with children's involvement in family meal choices and food preparation? (ii) Are there gender differences within the association between household FI and children's involvement in family meal choices and food preparation?

Methods

Sampling and consent

Details on sampling and data collection procedures for the Children's Lifestyle and School Performance Study (CLASS) have been previously described[8]. Briefly, data from CLASS, a cross-sectional population-based survey conducted among children in the fifth grade (10–11 years old) in Nova Scotia, Canada, were used for this study. All provincial public schools with fifth-grade children (*n* 286) were invited to participate; 94 % (*n* 269) agreed to do so. All parent(s)/guardian(s) of participating schools were invited to participate. Parental consent to participate was given for 6591 of the 8736 children (75·4 % consent rate). Of these, 1347 (20·4 %) children were excluded from analyses because they had incomplete data for variables assessed in the current study, leaving 5244 eligible children with complete data (79·6 % participation rate among those who consented).

Measures

Demographic information and household FS status were derived from surveys completed by the parent(s)/guardian(s). Household FS status was assessed using the six-item short form of the US Department of Agriculture Household Food Security Survey Module (HFSSM)[43]. This validated instrument was chosen to reduce respondent burden and avoid asking questions about children's FI because it was deemed too sensitive[43]. Households were classified as food-secure (score 0) or food-insecure (score 1–6)[8]. FI was treated as exposure in the analyses.

Children's involvement in family meal choices and food preparation were treated as proxies for children's food skills. Children were asked by trained research assistants to indicate (i) how often they helped make family meal choices and (ii) how often they helped prepare or cook food at home (e.g. make lunch or snacks). Response options for both questions included 'never', 'about once a month', 'about once a week', '2–3 times per week' or '≥4 times per week'.

Data analysis

All analyses, including descriptive analyses, were weighted to represent provincial estimates of fifth-grade child population in Nova Scotia[44]. Mixed-effects multinomial logistic regression models were used to examine the associations of FI with frequencies of children's involvement in family meal choices and food preparation, which were separately analysed and considered as categorical variables. Models were adjusted for clustering of students in schools, gender, region of residence, number of household residents and parental education attainment. Models were also stratified by gender to investigate gender-specific relationships while adjusting for the same covariates (except gender). Missing values were considered as separate covariate categories, but their estimates are not presented. Normality and homoscedasticity were found to be acceptable for linear regression models. All analyses were conducted using Stata/IC 14.

Results

Demographics

As shown in Table 1, approximately one-quarter of boys and girls lived in food-insecure households (24 %). Most children reported being involved in family meal choices or food preparation at least weekly (74 and 68 %, respectively). Approximately one in ten children reported

Table 1 Demographics of fifth-grade children (aged 10–11) in Nova Scotia, Canada by food security (FS) status – Children's Lifestyle and School Performance Study

	Total sample (*n* 5244)	Food secure (*n* 3964)	Food insecure (*n* 1280)
Gender (%)			
Female	52·2	51·1	55·4
Male	47·8	48·9	44·6
Region of residence (%)			
Rural	35·2	34·1	38·3
Urban	64·8	65·9	61·7
Number of household residents (%)			
2	3·7	2·9	6·2
3	17·2	16·7	18·7
4	44·7	47·4	36·7
5	22·4	22·1	23·2
>5	11·6	10·6	14·7
Parental education attainment (%)			
Secondary school or less	18·0	14·2	29·3
College	40·5	38·7	45·8
University	37·5	43·9	18·6
Helping choose family meals (%)			
Never	10·7	18·5	23·6
About once a month	15·7	27·4	27·8
About once a week	27·1	28·1	22·4
2–3 times per week	27·3	15·6	15·0
≥4 times a week	19·3	10·4	11·2
Helping prepare or cook food (%)			
Never	11·3	17·9	26·1
About once a month	20·4	25·2	24·0
About once a week	23·3	24·0	22·2
2–3 times per week	24·9	21·4	16·8
≥4 times a week	20·1	11·6	10·8

never helping choose family meals (11 %) or preparing food (11 %).

Children's involvement in family meal choices

Table 2 presents associations between gender, household FI status and frequencies of children's involvement in family meal choices. Notwithstanding household FS status, boys were less likely to help choose family meals compared to girls ($P < 0{\cdot}001$). Children from food-insecure households were as likely to help choose family meals as children from food-secure households. In the gender-stratified model, the likelihood of helping choose family meals once a week was 33 % lower among girls from food-insecure households compared to girls from food-secure households. No differences in boys' involvement in family meal choices were observed according to household FI status.

Children's involvement in family food preparation

Associations between household FI status and frequencies of children's involvement in food preparation are presented in Table 2. The expected probability of helping prepare food ≥4 times per week was 63 % higher for children from food-insecure households compared to children from food-secure households. However, the association between FS status and frequency of helping prepare meals was not significant when comparing children's involvement once a month, once a week or 2–3 times per week. Boys were 63–78 % less likely to help prepare meals compared to girls. In gender-stratified models, significant differences were only observed between boys. Boys from food-insecure households were 65 % more likely than boys from food-secure households to assist with food preparation/cooking ≥4 times per week. No differences in girls' involvement in food preparation were observed according to household FI status.

Discussion

This paper aimed to examine the relationship between household FI and children's involvement in family meal choices and food preparation, used as proxies for children's food skills. Our findings suggest that children living in food-insecure households were similarly involved in family meal choices and were more involved in food preparation than children living in food-secure households. There were gender differences within associations between household FI and children's involvement in family meals. Girls living in food-insecure households were less involved in food choices than their food-secure counterparts, whereas boys living in food-insecure households were more involved in family food preparation than boys living in food-secure households.

The prevalence of FI among the surveyed children was similar to provincial estimates for Nova Scotia in 2016–2017 (24 *v.* 22·8 %, respectively)[45]. Children in the present study were similarly involved in family food preparation to children of similar age in two other Canadian provinces[30,31]. Given that research examining the association between FI and food skills among children is lacking, we compared our findings with those among adults. Our findings contrasted with evidence from adults, whereby FI was not associated with food skills[40,41]. Possible explanations could include: that children were helping manage food resources in food-insecure households[16], that children had to care for themselves while their parents work low-income jobs, or that children ate meals outside of home less often and consequently had more opportunities to be involved in food preparation.

These findings should not be interpreted as a rationale to cease support for interventions aiming to improve food skills among children. Indeed, food skills have been associated with improved diet quality, eating behaviours, dietary variety, higher self-efficacy for healthy eating and healthier food preferences[22,23,29–34,46]. Yet, similar to evidence among adults[41], targeting children from food-insecure households for food skills interventions is not

Table 2 Associations of food insecurity with the frequency of helping choose family meals and frequency of food preparation/cooking among fifth-grade children (aged 10–11) in Nova Scotia, Canada

	Once a month			Once a week			2–3 times per week			≥4 times per week		
	RRR	95 % CI	*P*-value	RRR	95 % CI	*P*-value	RRR	95 % CI	*P*-value	RRR	95 % CI	*P*-value
How often do you help choose family meals?												
All students*												
Food-secure	1			1			1			1		
Food-insecure	0·96	0·74, 1·25	0·776	0·81	0·63, 1·04	0·100	1·01	0·80, 1·29	0·909	1·21	0·93, 1·59	0·154
Girls	1			1			1			1		
Boys	0·58†	0·46, 0·74†	<0·001†	0·41†	0·33, 0·51†	<0·001†	0·36†	0·29, 0·45†	<0·001†	0·38†	0·30, 0·47†	<0·001†
Girls only‡												
Food-secure	1			1			1			1		
Food-insecure	0·89	0·59, 1·34	0·576	0·67†	0·46, 0·97†	0·036†	0·95	0·68, 1·33	0·771	1·18	0·80, 1·73	0·395
Boys only‡												
Food-secure	1			1			1			1		
Food-insecure	1·01	0·72, 1·40	0·975	0·97	0·72, 1·31	0·848	1·03	0·74, 1·44	0·863	1·19	0·85, 1·66	0·300
How often do you help prepare or cook food in your home?												
All students*												
Food-secure	1			1			1			1		
Food-insecure	0·94	0·71, 1·23	0·652	1·07	0·83, 1·38	0·616	1·09	0·85, 1·40	0·507	1·63†	1·26, 2·10†	<0·001†
Girls	1			1			1			1		
Boys	0·37†	0·29, 0·48†	<0·001†	0·31†	0·24, 0·38†	<0·001†	0·22†	0·17, 0·28†	<0·001†	0·22†	0·18, 0·29†	<0·001†
Girls only‡												
Food-secure	1			1			1			1		
Food-insecure	0·77	0·48, 1·25	0·289	0·88	0·56, 1·38	0·577	0·85	0·56, 1·27	0·418	1·40	0·91, 2·15	0·122
Boys only‡												
Food-secure	1			1			1			1		
Food-insecure	1·02	0·74, 1·39	0·914	1·16	0·84, 1·59	0·375	1·30	0·92, 1·84	0·141	1·65†	1·19, 2·28†	0·002†

Reference: never helping. RRR, relative risk ratio.
*Adjusted for gender, region of residence, number of people in the household and parental education.
†Values are statistically significant ($P < 0·05$).
‡Adjusted for region of residence, number of people in the household and parental education.

supported by current evidence. Findings from the current study suggest that children living in food-insecure households had similar or better food skills than children from food-secure households, as evidenced by their involvement in family meal choices and food preparation. Yet, they may need support to further improve food skills, to ensure they are preparing food safely, and to support increased self-efficacy. Therefore, improving food skills of *all* children should be explored as a health promotion strategy in the context of population food de-skilling[42]. In addition, further qualitative research should investigate *how and why* FI influences children's involvement in family meal choices and preparation and explore gender differences.

Strengths and limitations

This study's results should be interpreted in light of its strengths and limitations. The large population-based sample and use of weights ensured the representativeness of the sample. Food skills were not assessed comprehensively, as only two proxies were evaluated[20]. The questions used to assess children's involvement in family meal choices or food preparation in this survey have been used elsewhere[29] and were reported by children themselves. However, more research is required to assess their validity and reliability. Yet, they were positively associated with self-efficacy for healthy eating choices in this sample (data not shown) and another sample using similar questions[29]. Information about the type of foods children helped to prepare and the meal preparation tasks children were involved in were not gathered in this study. Therefore, we could not distinguish whether children helped prepare home food from (healthy) unprocessed foods or from (unhealthy) ultra-processed foods[47]. Future researchers should develop better tools to assess food skills and food literacy among children. Household FI status was also grouped into four categories (FS: score 0; marginal FI: score 1; moderate FI: score 2–4; and severe FI: score 5–6). The results were similar and there was no evidence of a gradient (data not shown). The six-item HFSSM may have underestimated the prevalence of FI as it does not capture anxiety or concerns with regard to accessing food, nor does it inquire about FI among children within the household. Further, it assesses parents' perceptions, which may not represent children's lived experience of FI[16]. Lastly, causation could not be inferred due to the cross-sectional study design.

Conclusion

Based on the current study's findings, interventions aiming to improve food literacy among children to reduce FI are unlikely to be effective because we found that children living in food-insecure households were similarly involved in family meal choices and more involved in family meal preparation, indicators of similar and better food skills, compared with those living in food-secure households. Findings from this study support that household FI is not due to a lack of food skills but most likely due to a problem of access to resources[48]. This supports the call of previous research for upstream policies targeting the structural issues underpinning household FI such as low income[3,14].

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