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Food insecurity and mental health during the COVID-19 pandemic

by Jane Y. Polsky and Heather Gilmour

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ABSTRACT

Background

Food insecurity has been linked to adverse mental health outcomes. This study assessed the association between household food insecurity and self-perceived mental health status and anxiety symptoms among Canadians in the early months of the COVID-19 pandemic.

Data and methods

The Canadian Perspectives Survey Series 2 collected cross-sectional data from May 4 to 10, 2020, on Canadians aged 15 years or older residing in the ten provinces. The brief six-item Household Food Security Survey Module was used to measure participants' households as food secure or marginally, moderately or severely food insecure within the previous 30 days. Logistic regression was used to assess associations between food security status and self-perceived fair or poor mental health and moderate or severe anxiety symptoms, adjusting for sociodemographic covariates.

Results

Approximately one in seven Canadians (14.6%) lived in a household that experienced some level of food insecurity. Of these individuals, 9.3% reported recently accessing free food from a community organization. About one in five Canadians self-perceived their mental health as fair or poor (22.0%), or self-reported moderate or severe anxiety symptoms (18.2%). With covariate adjustment, individuals in households with moderate food insecurity had nearly three times higher odds of reporting fair or poor mental health, and moderate or severe anxiety symptoms, compared with individuals in food-secure households. Among those with severe food insecurity, adjusted odds ratios were 4.0 (95% confidence interval [CI]: 2.0 to 7.9) for fair or poor mental health, and 7.6 (95% CI: 3.9 to 14.7) for moderate or severe anxiety symptoms.

Interpretation

In the early period of the COVID-19 epidemic in Canada, household food insecurity was independently associated with poorer mental health outcomes. Monitoring both food insecurity and mental health will be important as the COVID-19 pandemic continues.

Keywords

food security, perceived mental health, GAD-7, COVID-19 financial impacts, SARS-CoV-2, pandemic, self-report

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What is already known on this subject?

- Income-related food insecurity has been associated with poorer diet quality and a variety of physical and mental health problems.
- Few studies have examined food insecurity in the context of stressful events.
- In the context of the COVID-19 pandemic, the already stressful experience of food insecurity may be further compounded by imposed social isolation and worries about new health risks and financial insecurity.

What does this study add?

- This study is the first to examine the association between household food insecurity and self-perceived mental health and anxiety symptoms among Canadians in the context of the COVID-19 pandemic.
- Compared with those in food-secure households, Canadians living in households that experienced income-related food insecurity during the previous 30 days were significantly more likely to self-perceive their mental health as fair or poor and to report moderate or severe anxiety symptoms in the early pandemic period.
- Overall, an estimated 1.7% of Canadians reported that their household had recently accessed free food or meals from a community organization. The corresponding percentage was 9.3% among those living in food-insecure households.

Food insecurity refers to the inability to access a sufficient quantity or variety of food because of financial constraints, and is an established marker of material deprivation in Canada.^{1,2} Based on the most recent available national-level data, 8.8% or 1.2 million households experienced food insecurity in 2017/2018.³ Certain population groups are more likely to be food insecure, such as lone-parent households, individuals who rely on government assistance as their main source of income and individuals who rent their home.³⁻⁵

There is consistent evidence that household food insecurity is associated with lower diet quality and a variety of physical health problems, including elevated risk of diabetes and cardiovascular disease.⁶⁻⁹ A growing number of studies have also documented links between food insecurity and adverse mental health outcomes, such as higher rates of depression, stress and anxiety, and poor self-perceived mental health.¹⁰⁻¹²

Few studies have examined food insecurity in the context of stressful events.^{13,14} Since approximately mid-March 2020, the pandemic of the novel coronavirus disease 2019 (COVID-19) has abruptly and profoundly impacted the lives of Canadians, with millions experiencing job losses or reduced work hours,¹⁵ and fewer reporting excellent or very good mental health.¹⁶ Using national-level data collected in early May 2020, this study is the first to examine the association between household food insecurity and self-perceived mental health and anxiety symptoms among Canadians in the context of the COVID-19 pandemic.

Methods

Data source

Canadian Perspectives Survey Series 2 – Monitoring the effects of COVID-19

The cross-sectional Canadian Perspectives Survey Series 2 (CPSS2) survey collected information on COVID-19's impact on labour market and mental health outcomes, and household food security status for the Canadian population aged 15 or older living in the ten provinces.¹⁷ The CPSS2 sample was selected from four Labour Force Survey (LFS) rotation groups that completed the LFS for the last time in 2019. Individuals living on reserves and Aboriginal settlements in the provinces, full-time members of the Canadian Armed Forces, the institutionalized population, and households in extremely remote areas with very low population density are excluded from the LFS. Together, these groups represent an exclusion of less than 2.0% of the Canadian population aged 15 or older.

One household member was selected at random to complete the CPSS2. Data were collected from May 4 to May 10, 2020. Of the 7,242 Canadians who were invited to complete this online survey, 4,600 responded, for a collection response rate of 63.5%. After excluding respondents with missing data on household food security status (2.3%), the final analytical sample consisted of 4,481 respondents, which represents a population of 30 million.

Measures

Household food security status

Household food security status was assessed using the six-item Household Food Security Survey Module (HFSSM) short form.¹⁸ This is a validated subset of the 18-item HFSSM, which has been used to monitor income-related food insecurity in Canada since 2005.¹ All respondents were asked six questions about the food situation in their household during the past 30 days. The questions addressed situations including running out of food before there was money to buy more, being unable to afford balanced meals, and skipping meals or going hungry because of insufficient money for food. Responses of “yes,” “sometimes true” and “often true,” and reporting three or more days of cutting or skipping meals were coded as affirmative responses. Four categories were defined:¹⁸

- food secure: no affirmative responses
- marginally food insecure: only one affirmative response
- moderately food insecure: two to four affirmative responses
- severely food insecure: five to six affirmative responses.

Respondents were also asked whether their household had accessed free food or meals from a community organization in the past 30 days (“yes” or “no”). Because of sparse data, only high-level prevalence estimates were generated for this variable.

Mental health outcomes

Current self-perceived mental health was assessed by asking respondents, “In general, how would you describe your mental health?” and was classified as fair or poor versus excellent, very good, or good.

Feelings of anxiety were assessed using the seven-item Generalized Anxiety Disorder scale (GAD-7).¹⁹ Respondents were asked how often they were bothered by “feeling nervous, anxious or on edge,” “not being able to stop or control worrying,” “worrying too much about different things,” “trouble relaxing,” “being so restless that it is hard to sit still,” “becoming easily annoyed or irritable,” and “feeling afraid as if something awful might happen” in the two weeks prior to completing the survey. Scores of zero, one, two and three were assigned to the response categories of “not at all,” “several days,” “more than half the days,” and “nearly every day,” respectively. A total score of 10 or higher corresponded to moderate or severe anxiety symptoms, and a score of less than 10 corresponded to no symptoms, minimal symptoms, or mild symptoms.²⁰

Covariates

Age in years (15 to 34, 35 to 54, and 55 or older) and household size (one, two, or three or more members) were grouped for prevalence estimates and entered as continuous variables in multivariable analyses. The presence of any children younger than age 18 in a household was used to classify respondents as having children in the household. For marital status, respondents were classified as married or common law; separated, widowed or divorced; or single. For immigration status, respondents were categorized as non-immigrants or immigrants (landed immigrant or other immigration status).

For respondents aged 18 to 64, employment status indicated whether the respondent was employed in the week prior to the interview (April 26 to May 2, 2020). Respondents younger than age 18 and older than age 64 were grouped together and considered not of working age.

Respondents were asked to report the financial impact of COVID-19 on their ability to meet financial obligations or essential needs (e.g., mortgage payments, utilities, groceries) in the previous week as major, moderate, minor, none, or uncertain (“too soon to tell”).

Analytical techniques

Weighted frequencies and cross-tabulations were generated to examine the prevalence of mental health outcomes and sociodemographic covariates in the overall sample and by household food security status. Sociodemographic covariates that were significantly related to either mental health outcome or to household food insecurity were selected for inclusion in regression analyses. Multivariable logistic regression was used to estimate associations of household food insecurity with each adverse mental health outcome while adjusting for covariates. Effect modification by sex and age was assessed by adding multiplicative interaction terms to final models. Survey weights were applied to account for survey design and non-response, and bootstrap weights were applied to estimate standard errors. All analyses were conducted in SAS 9.4 and SAS-Callable SUDAAN 11.0. Statistical significance was assessed at two levels: $p < 0.05$ (*) and $p < 0.01$ (**).

Results

The majority of Canadians (85.4%) lived in a food-secure household, while 14.6% reported some experience of food insecurity within 30 days before the survey (Table 1). Compared with their food-secure counterparts, those living in a household experiencing some level of food insecurity were more likely to be male, younger and single. They were also more likely to live in a larger household or a household with children, and to be unemployed or to have experienced a financial impact from COVID-19.

Overall, an estimated 1.7%^E (E superscript denotes that the estimate should be interpreted with caution because of a high

Table 1
Sociodemographic characteristics overall and stratified by household food security status, household population aged 15 or older, Canada excluding territories, 2020

Characteristic	Food security status									
	Overall		Secure [†]		Marginally insecure		Moderately insecure		Severely insecure	
	percentage	standard error	percentage	standard error	percentage	standard error	percentage	standard error	percentage	standard error
Overall	...	...	85.4	0.9	5.8	0.6	6.8	0.8	2.0	0.3
Sex										
Female	50.4	0.2	50.7	0.6	37.8 *	4.9	56.2	6.0	54.3	8.3
Male	49.6	0.2	49.3	0.6	62.2 *	4.9	43.8	6.0	45.7 ^E	8.3
Age group										
15 to 34 years	31.6	0.1	29.1	0.7	49.1 **	5.2	49.4 **	6.0	24.3 ^E	7.5
35 to 54 years	31.5	0.1	31.2	0.5	28.1	4.4	31.7	4.7	53.5 *	8.6
55 or older	37.0	0.2	39.7	0.5	22.8 ^{E**}	3.8	18.9 ^{E**}	4.1	22.2 ^{E*}	6.9
Marital status										
Married or common law	62.6	1.1	65.0	1.2	53.9	5.9	46.4 **	6.0	42.9 ^{E**}	8.1
Divorced, widowed or separated	10.0	0.6	9.7	0.6	7.5 ^E	2.0	11.2 ^E	2.7	F	F
Single	27.4	0.9	25.3	1.1	38.6 *	5.9	42.4 **	6.3	F	F
Household size										
One member	15.3	0.7	14.9	0.8	15.9 ^E	3.2	17.0 ^E	3.4	26.7 ^E	6.4
Two members	51.3	1.1	53.8	1.2	50.4	5.4	25.2 **	4.1	33.9 ^{E**}	7.4
Three members or more	33.4	1.2	31.3	1.3	33.7	5.4	57.8 **	5.7	39.4 ^E	9.5
Children in household										
Yes	34.4	1.1	32.5	1.2	44.4 *	5.6	45.3 *	6.3	46.2 ^E	8.3
No	65.6	1.1	67.5	1.2	55.6 *	5.6	54.7 *	6.3	53.8	8.3
Immigration status										
Non-immigrant	76.1	1.1	76.3	1.2	75.1	4.5	74.0	5.6	74.1	7.4
Immigrant	23.9	1.1	23.7	1.2	24.9 ^E	4.5	26.0 ^E	5.6	25.9 ^E	7.4
Employment status										
Employed	51.2	1.1	52.4	1.1	53.8	5.6	38.8 *	5.7	F	F
Not employed	23.4	1.2	20.7	1.1	28.1 ^E	5.1	43.7 **	6.5	54.8 **	8.6
Not working age	25.4	0.8	26.8	0.9	18.1 ^{E*}	4.1	17.5 ^E	5.0	F	F
Financial impact of COVID-19										
Major impact	9.3	0.8	6.4	0.8	17.4 ^{E**}	3.9	27.4 ^{E**}	4.7	47.6 ^{E**}	8.5
Moderate impact	15.9	1.0	13.1	0.9	37.2 **	5.7	30.1 ^{E**}	5.8	25.7 ^E	6.9
Minor impact	21.0	1.0	21.3	1.1	19.9 ^E	4.4	22.4 ^E	5.4	F	F
No impact	42.9	1.4	48.5	1.5	11.1 ^{E**}	2.7	F	F	F	F
Too soon to tell	10.9	0.8	10.8	0.9	14.5 ^E	3.3	F	F	F	F

... not applicable

* significantly different from reference category (p < 0.05)

** significantly different from reference category (p < 0.01)

† Reference category

^E Interpret with caution (coefficient of variation 16.6% to 33.3%)

^F Too unreliable to publish (coefficient of variation > 33.3% or sample too small)

Source: 2020 Canadian Perspectives Survey Series 2 - Monitoring the Effects of COVID-19.

coefficient of variation) of Canadians (95% CI: 1.1 to 2.7%) reported that their household had accessed free food or meals from a community organization during the previous 30 days. The corresponding percentage was 9.3%^E (95% CI: 5.4 to 15.5%) among those in food-insecure households, and 0.4%^E (95% CI: 0.3 to 0.7%) in food-secure households.

About one in five Canadians self-perceived their mental health as fair or poor (22.0%), or reported moderate or severe anxiety symptoms (18.2%) (Figure 1). Compared with individuals in food-secure households, the prevalence of fair or poor self-perceived mental health and moderate or severe anxiety symptoms was substantially higher among individuals in households with moderate food insecurity (45.3% and 45.0%,

respectively) and severe food insecurity (51.0% and 70.5%, respectively).

Higher levels of food insecurity were associated with higher odds of reporting both fair or poor self-perceived mental health and moderate or severe anxiety symptoms (Table 2). Odds ratios were attenuated but remained significant after adjustment for additional sociodemographic covariates (Model 2) compared with models adjusted for age and sex only (Model 1). Compared with individuals in food-secure households, Canadians in moderately food-insecure households had nearly three times higher odds of reporting either adverse mental health outcome. Those in severely food-insecure households had four times higher odds of reporting fair or poor self-

perceived mental health, and more than seven times higher odds of reporting moderate or severe anxiety symptoms, independent of relevant covariates.

Younger people, females, and individuals who were divorced, widowed or separated had significantly higher odds of self-reporting either adverse mental health outcome (Table 2). Individuals who reported experiencing a major, moderate or uncertain (“too soon to tell”) financial impact because of COVID-19 had at least two times higher odds of self-reporting moderate or severe anxiety symptoms compared with those who reported no financial impact. For fair or poor self-perceived mental health, only an uncertain financial impact was a significant risk factor.

There was no effect modification of sex or age on the association between food insecurity and mental health outcomes (data not shown).

Discussion

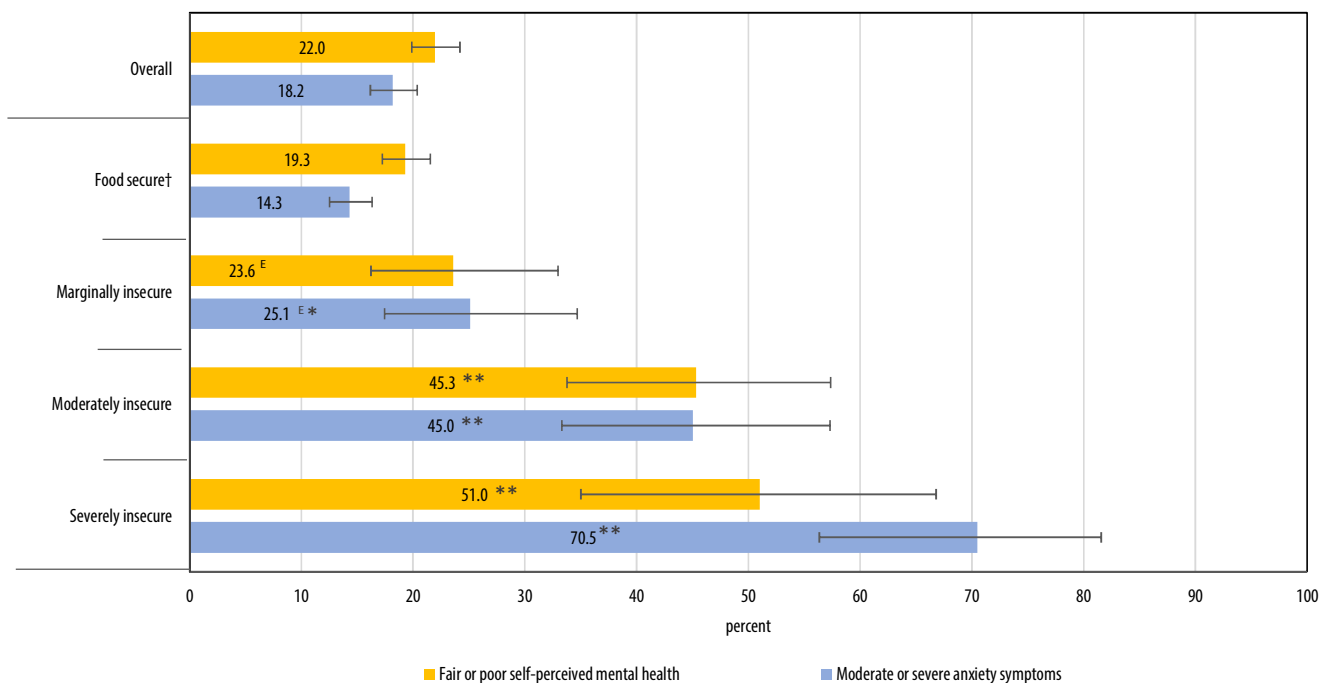
Since approximately mid-March 2020, the COVID-19 pandemic has had wide-ranging impacts on the lives of

Canadians, including increased health risks and disruptions to employment, schooling and daily routines. This study relies on data collected in early May 2020, when many lockdown measures were still in effect across much of the country, to examine the association between income-related household food insecurity—an established marker of material deprivation—and self-perceived mental health and anxiety in the Canadian population.

During this challenging time, Canadians who recently experienced household food insecurity were significantly more likely than individuals in food-secure households to self-report fair or poor mental health and moderate or severe anxiety symptoms. These associations persisted after taking into account a range of sociodemographic characteristics, including employment status and financial impact of COVID-19.

These findings are consistent with a number of reports documenting that household food insecurity is a significant independent risk factor for poorer mental well-being, including higher levels of fair or poor mental health, anxiety, depression and psychiatric morbidity,^{10-12,21} and increased use of health care services.^{22,23} These previous findings and the present

Figure 1
Prevalence of fair or poor self-perceived mental health and moderate or severe anxiety symptoms by household food security status, household population aged 15 or older, Canada excluding territories, 2020



* significantly different from reference category (p < 0.05)

** significantly different from reference category (p < 0.01)

† Reference category

E Interpret with caution (coefficient of variation 16.6% to 33.3%)

Note: Error bars represent 95% confidence intervals.

Source: 2020 Canadian Perspectives Survey Series 2 - Monitoring the Effects of COVID-19.

Table 2
Adjusted odds ratios of fair or poor mental health and moderate or severe anxiety symptoms, by food security status and sociodemographic characteristics, household population aged 15 or older, Canada excluding territories, 2020

Characteristic	Fair or poor self-perceived mental health						Moderate or severe anxiety symptoms					
	Model 1			Model 2			Model 1			Model 2		
	Adjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval		Adjusted odds ratio	95% confidence interval	
from		to	from		to	from		to	from		to	
Food security status												
Food secure [†]	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Marginally insecure	1.11	0.65	1.88	1.14	0.65	2.02	1.92 *	1.13	3.24	1.37	0.78	2.42
Moderately insecure	2.76 **	1.62	4.71	2.80 **	1.62	4.84	4.28 **	2.40	7.62	2.79 **	1.52	5.13
Severely insecure	4.28 **	2.16	8.48	3.97 **	1.98	7.93	14.35 **	7.95	25.90	7.57 **	3.90	14.72
Age, years	0.97 **	0.96	0.98	0.97 **	0.96	0.98	0.98 **	0.97	0.99	0.99	0.98	1.01
Sex												
Females	1.46 **	1.12	1.91	1.44 **	1.10	1.88	1.50 *	1.10	2.05	1.56 **	1.13	2.16
Males [†]	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Marital status												
Married or common law [†]	1.00	...	...	...	...	...	1.00	...	...
Divorced, widowed or separated	...	...	...	1.71 **	1.17	2.52	...	...	...	1.85 **	1.21	2.84
Single	...	...	...	1.39	0.95	2.04	...	...	...	1.65 *	1.01	2.71
Household size, # of members	...	...	...	1.03	0.86	1.23	...	...	...	1.19	0.99	1.43
Children in household												
Yes	...	...	...	0.66 *	0.47	0.92	...	...	...	0.85	0.56	1.28
No [†]	1.00	...	...	...	...	...	1.00	...	...
Employment status												
Employed [†]	1.00	...	...	...	...	...	1.00	...	...
Unemployed	...	...	...	1.27	0.91	1.78	...	...	...	0.78	0.53	1.16
Not working age	...	...	...	0.70	0.43	1.14	...	...	...	0.70	0.43	1.14
Financial impact of COVID-19												
Major impact	...	...	...	0.87	0.51	1.49	...	...	...	3.82 **	2.24	6.53
Moderate impact	...	...	...	0.78	0.51	1.19	...	...	...	2.56 **	1.54	4.24
Minor impact	...	...	...	1.00	0.67	1.49	...	...	...	1.36	0.79	2.33
No impact [†]	1.00	...	...	...	...	...	1.00	...	...
Too soon to tell	...	...	...	1.75 **	1.17	2.64	...	...	...	2.12 **	1.31	3.43

... not applicable

* significantly different from reference category (p < 0.05)

** significantly different from reference category (p < 0.01)

[†] Reference category

Source: 2020 Canadian Perspectives Survey Series 2 - Monitoring the Effects of COVID-19.

study’s results confirm that despite tracking closely with other dimensions of socioeconomic disadvantage, food insecurity is an independent risk factor for poorer health.⁵

Feelings of distress and anxiety can be understood as natural reactions during times of significant societal upheaval and are not necessarily indicators of a long-term mental health disorder. However, at the population level, the COVID-19 pandemic’s health impacts, containment measures and ensuing economic fallout are expected to result in a rise in mental health disorders and poorer mental well-being both in the short and long term.^{24,25} The ensuing mental health impacts are, and will continue to be, more pronounced among vulnerable groups, such as those living with pre-existing medical conditions and low income.²⁴⁻²⁶ Unsurprisingly, this study found that Canadians who experienced food insecurity because of financial constraints, and particularly those who experienced

moderate or severe food insecurity, reported significantly poorer mental health outcomes in the early pandemic period than those in food-secure households.

Food insecurity is a highly stressful experience.^{12,27,28} Increasing levels of food insecurity may result in even higher levels of stress, frustration, feelings of powerlessness and alienation, and possible feelings of shame associated with experiencing greater challenges in accessing food—which may trigger new or amplify pre-existing psychosocial stressors.^{27,29,30} In the context of COVID-19, these feelings may be compounded further by imposed social isolation and worries about new health risks and financial insecurity.^{25,27}

Among Canadians living in food-insecure households, an estimated 9.3%^E reported that their household had used a community organization to access free food within the past month. Although there are no national-level data for

comparison with pre-pandemic levels, this estimate is generally consistent with previous indications of the low propensity of food-insecure households to use food banks and other community food programs, which are typically accessed as means of last resort.^{31,32} As the COVID-19 pandemic and its economic fallout continue, it would be prudent to monitor patterns of community food program use and of other coping strategies related to food insecurity to inform the design of appropriate policy and program responses. Future studies are also needed to assess the impact of income and other policy interventions associated with COVID-19 on both food insecurity levels and mental health outcomes.

Strengths and limitations

Strengths of this study include reliance on a timely, nationally representative survey of Canadians, and a nuanced assessment of four levels of food security status. However, the participation rate in the CPSS2 panel was lower than in typical social surveys conducted by Statistics Canada, which increases potential non-response bias.

The CPSS2 sample underrepresents individuals who are divorced, separated or widowed, and those who rent their home, and overrepresents people born in Canada, individuals who are married and households with children.³³ The sample also excludes individuals without Internet access and some of the groups that are most vulnerable to food insecurity (i.e., the homeless population, residents of the territories and remote regions, and on-reserve First Nations people).³⁻⁵ These differences and exclusions may result in an underestimate of the association between food insecurity and mental health measures.

Because this study is cross-sectional, pre-COVID-19 food security levels and mental health status could not be ascertained, and neither could the direction of association. Although it is plausible that the stressful experience of food insecurity leads to poorer mental health, the association can be bidirectional.^{27,28,30}

Household food security status was assessed using the six-item short-form HFSSM. Unlike the 18-item HFSSM, the short form does not ask questions specific to the food security status of children in the household, and may underestimate the more severe range of food insecurity.^{18,34} Furthermore, although a single affirmative response to the six-item HFSSM may be classified as marginal food insecurity, it cannot be reliably distinguished from zero affirmative responses (i.e., the food secure category).^{18,34} Therefore, results for the marginally food insecure may be attenuated and should be interpreted with caution. Finally, estimates of food insecurity obtained from this study are not directly comparable with those obtained from the full 18-item HFSSM.

Conclusions

Supporting a growing body of literature, this study showed that food insecurity was independently associated with poorer mental health outcomes. In the context of the current COVID-19 pandemic—with one in five Canadian households continuing to report difficulty meeting financial needs,³⁵ and an uncertain economic recovery ahead—it will be critical to monitor both food security and mental health status. Awareness of the strong link between food insecurity and poorer mental health outcomes can help guide strategies aimed at improving the well-being of vulnerable populations. Future studies should assess the impact of income and other policy interventions associated with COVID-19 on both food insecurity levels and mental health outcomes.

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