Household Food Insecurity and Mental Health Problems Among Adolescents: What Do Parents Report?

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ABSTRACT

OBJECTIVE: To investigate whether adolescents living in households with food insecurity have poorer parent-reported mental health (MH) than peers.

METHODS: We analyzed cross-sectional data from ~8600 adolescents who participated in the 2007 (8th grade) wave of the Early Childhood Longitudinal Study–Kindergarten. Household food insecurity (HFI) was assessed by parental report on the 18-item US Household Food Security Scale. Total Difficulties score >13 on the parent-reported Strengths and Difficulties Questionnaire (SDQ) indicated problems with adolescent MH. SDQ subscale scores (Emotional, Conduct, Hyperactivity, Peer Problems) were also calculated. Associations between HFI and MH were explored in bivariate and multivariable analyses. Interactions of HFI and gender and HFI and receipt of free/reduced-price school lunch were analyzed with regard to problems with MH.

RESULTS: A total of 10.2% of adolescents lived with HFI; 11.2% had SDQ >13. Adolescents with HFI had higher rates of overall MH problems (28.7% vs 9.2%), emotional problems (21.6% vs 6.6%), conduct problems (26.5% vs 11.6%), hyperactivity (22.4% vs 11.3%), and peer problems (19.8% vs 8.6%) (all $P < .01$). After adjustment for confounders, the association between HFI and overall MH problems (odds ratio 2.3; 95% confidence interval 1.6–3.3) remained. Interactions of HFI and gender and HFI and free/reduced-price school lunch were not significant.

CONCLUSIONS: HFI was associated with increased risk of parent-reported MH problems among both male and female adolescents. Free/reduced-price school lunch did not significantly alter this relationship. Effective interventions to promote MH and reduce HFI among adolescents are necessary.

KEYWORDS: adolescent; food insecurity; mental health; parent report; Strengths and Difficulties Questionnaire

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WHAT'S NEW

Adolescents living in households with food insecurity are at increased risk for parent-reported mental health problems, even after adjusting for other risk factors.

FOOD INSECURITY IS defined as "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways."[1] Food insecurity has been described as a "complex multidimensional phenomenon," and since 1995 has been assessed nationally by a standardized 18-item Household Food Security Scale developed by the United States Department of Agriculture, which uses a variety of indicators to capture various combinations of food conditions and experiences.[1] Food insecurity currently affects 14.5% of US households and 20% of US households with children.[2] In the United States, unlike in the developing world, food insecurity is often a hidden problem. Nevertheless, it has been shown to have deleterious effects on children's health.[3,4]

There is a growing body of evidence indicating that among young and school-age children, food insecurity is associated with increased risk of developmental problems,[5] more internalizing and externalizing behavior problems,[6,7] difficulty with socialization,[6,7] and academic difficulties.[6–8] Like early childhood, adolescence is a period of rapid growth and brain development.[9] It is plausible that exposure to household food insecurity (HFI) during this particularly vulnerable period could adversely affect adolescents' mental health (MH), possibly, as postulated by others, by acting as a biological stressor, leading to less than optimal nutrition, as well as a psychological stressor for the family and adolescent.[10,11] However, to date, a paucity of literature has explored associations between food insecurity and MH among adolescents. Although the few published studies in this area have shed light on possible associations between food insecurity and adolescent MH, they have been limited by small or local samples, inconsistent

measurements of food insecurity, and failure to adjust for important potential confounders such as maternal depression[12] and stressful life events. To our knowledge, no study has utilized data from a nationally representative sample and validated measures of both HFI and adolescent MH, adjusting for important potential confounders to assess this relationship.

One unmatched case-control study focused on 228 school-age children 6 to 17 years old who were homeless or living in low-income housing in Massachusetts. That study reported that after controlling for housing status, mother's distress, and stressful life events, "severe child hunger" was associated with higher rates of mother-reported child anxiety.[11] Another study of children aged 4 to 14 years living in Chicago investigated the associations of poverty and food insecurity over a 2-year period; it reported that persistent food insecurity was associated with both internalizing and externalizing problems after adjusting for confounders, including caregiver depression.[13]

A larger study that analyzed data from the 2002 National Survey of American Families for 11,139 adolescents aged 12 to 17 reported that food insecurity was associated with increased parental emotional distress, poor quality of parenting, and increased adjustment problems among adolescents.[14] Two reports using data from the Third National Health and Nutrition Examination Survey (NHANES III) reported associations between food insufficiency and having been seen by a psychologist, having been suspended from school, and difficulty getting along with peers,[6] as well as depressive and suicidal symptoms among adolescents.[15] These studies both investigated associations between food insufficiency and important aspects of MH but did not adjust for caregiver depression or stressful life events, either of which could have explained the associations between food insecurity and parent-reported MH. It is also important to note that in NHANES III, a child was defined as "food insufficient" if the family member completing the survey reported that the family "sometimes or often did not have enough food to eat."[6,15] In contrast to the question about food insufficiency included in NHANES III and used in those studies, the US Household Food Security Scale, which has been used more recently in national surveys, captures the multidimensional nature of food insecurity, including whether the family worried that food would run out before getting money to buy more or could not afford to buy balanced meals.[1]

The purpose of this study was to use data from a nationally representative sample, as well as validated measures of HFI and adolescent MH, to evaluate the hypothesis that after adjustment for potential confounders, including parental symptoms of depression and stressful life events, adolescents from households with food insecurity are more likely than peers to have problems with MH on the basis of parental report.

Because prior research has suggested that girls and boys may respond differently to food insecurity with regard to other aspects of health,[7,16] we also were also interested in assessing whether the association between HFI and MH differs by gender, which to our knowledge has not previously been tested.

Additionally, we sought to determine whether receipt of free/reduced-price school lunch, which potentially could reduce to some extent biological and psychological stress related to uncertain access to nutritious food, buffers the relationship between HFI and adolescent MH.

METHODS

We used publicly available data from the 2007 (8th grade) wave of the Early Childhood Longitudinal Study–Kindergarten (ECLS-K) class of 1998–1999, a study that followed a large and nationally representative cohort of children from kindergarten until 8th grade. A detailed description of the ECLS-K methodology is available online (http://nces.ed.gov/ecls/kindergarten.asp).[17]

Data were obtained primarily from the ECLS-K 8th grade parent interview, which was conducted by telephone using a computer-assisted interview. A small percentage (2.2%) of interviews were conducted in person. In 88% of the cases, the respondent was the child's mother, and in 9% of the cases, the respondent was the child's father. In 3% of the cases, the respondent was another caregiver in the home, most commonly the child's grandparent. Hereafter, we use the term *parent* to refer to the responding caregiver.

The study population consisted of ~8600 students aged 12 to 16 years. Although most students were 8th graders, students who were in kindergarten in the base year sample and who were retained 1 or more years or skipped a grade were also included in the sample.

MEASURES

HFI

The US Household Food Security Scale, a standardized 18-item measure designed to assess the household's food situation and economically based difficulties in meeting food needs in the past 12 months,[18] was administered to the parent via telephone interview to assess household food security status. Scores on the Household Food Security Scale were computed by ECLS-K in accordance with standardized scoring guidelines. Households in which the parent affirmed 3 or more items on the scale were characterized by ECLS-K as food insecure.[1,17]

ADOLESCENT MH

Parental report of adolescent MH was measured using the Strengths and Difficulties Questionnaire (SDQ), a 25-item MH measure that has been used widely for clinical and research purposes and as a screening tool, and has been demonstrated to identify likely cases of MH disorders, based on DSM-IV criteria.[19–22] Parents reported whether each item was "not true," "somewhat true," or "certainly true." In accordance with scoring recommendations, the items were summed to create 5 subscale scores, including Emotional Symptoms, Conduct Problems, Hyperactivity, Peer Problems, and Pro-social Scale. Four of the 5 can be totaled to create a Total Difficulties score, which we used

as the primary outcome measure. The fifth, the Pro-social Scale, is not included in the Total Difficulties score, but was analyzed separately. For each subscale, we used the recommended cut points to trichotomize scale scores as "Normal" versus "Borderline" versus "Abnormal."[23] Because we were interested in adolescents at high risk for MH problems, we collapsed the latter 2 categories to create a dichotomously coded variable (No Problem vs Problem) for each of the subscales and the Total Difficulties score. Adolescents with Total Difficulties scores of >13 were considered to have a problem with MH.[19] Further information on the SDQ is available online (http://sdqinfo.org).[23]

Covariates and Potential Confounders

Covariates and potential confounders included in the models were chosen a priori on the basis of previously described or hypothesized associations between them, HFI, and/or adolescent MH. These included: adolescent age, grade level, race, body mass index, parent health status and depressive symptoms, maternal age during the 8th grade wave of the ECLS-K, marital status, highest degree earned by the parent, poverty status, parental report of neighborhood safety, and stressful life events. As part of the ECLS-K direct child assessment, each child's weight and height were measured using a standardized procedure, and body mass index was calculated by ECLS-K. Parent health status was assessed on the basis of the parent's response to the question, "In general, would you say your health is… excellent, very good, good, fair, or poor?" Poverty status was characterized in ECLS-K on the basis of whether the family's income was at or above vs below the federal poverty threshold at the time of the survey. Depressive symptoms of the responding parent were assessed on the basis of scores on an abbreviated 12-item version of the Center for Epidemiologic Studies Depression Scale, a validated, self-report MH questionnaire.[17] Those with scores above 9 were considered to have moderate to severe depressive symptoms, and will be referred to as depressed.[24] Number of stressful life events reported by the parent in the past year (mugged/robbed/attacked, lost job, electricity or phone cut off, change in income, hospitalized, change in marital status, death in family) were summed and trichotomized into 0, 1, or ≥2 stressful life events on the basis of bivariate associations between number of stressful life events and problems with adolescent MH. The parent also reported whether the child received free/reduced-price school lunch.

Statistics and Data Analyses

Associations of parent-reported adolescent MH with HFI, and adolescent and family characteristics were explored first in bivariate analyses by Pearson's chi-square test. In multivariable analyses, logistic regression models were constructed to assess the independent associations of having a MH problem on each of the SDQ subscales and the Total Difficulties scale (dependent variables) with HFI (independent variable), while adjusting for adolescent and family characteristics.

Interactions of HFI with gender and of HFI with receipt of free/reduced-price school lunch were also tested in separate models for the primary outcome (Total Difficulties score >13). Data were weighted using standardized weighting procedures described in the ECLS-K.[17] Stata/IC 11.0 (StataCorp, College Station, Tex) was used to adjust for complex sampling design.

Results

In this sample, 10.2% of adolescents lived in households with food insecurity, and 11.2% were reported by their parents to have problems with MH. The characteristics of the sample and relationships with HFI and with adolescent MH are shown in Table 1. Grade level, poverty status, income below the poverty threshold, parent not married, level of parent education, fair/poor parent health, parent depression, receipt of free/reduced-price school lunch, unsafe school, unsafe neighborhood, and number of stressful life events were found to be significantly associated with both HFI and problems with MH in bivariate analyses. Race/ethnicity was found to be significantly associated with HFI. Male gender was found to be significantly associated with problems with MH.

In bivariate analysis, adolescents with HFI had significantly higher rates of parent-reported overall MH problems, emotional problems, conduct problems, hyperactivity, peer problems, and less optimal pro-social behavior (ie, pro-social problems) (Figure).

As shown in Table 2, after adjustment for covariates and confounders, HFI was independently associated with more than a 2-fold increased risk of parent-reported MH problems among adolescents. Parent-reported MH problems were also significantly more likely among male adolescents, adolescents who have repeated 1 or more years of school, adolescents with older mothers, adolescents with parents who reported poorer physical health or depressive symptoms, and adolescents whose schools were reported to be unsafe. In addition, adolescents who had 1 or more stressful life event, as reported by their parents, were also at increased risk of problems with MH.

In separate logistic regression models, which adjusted for the above-listed confounders and covariates, adolescents with HFI had significantly increased risk of emotional (adjusted odds ratio [aOR] 2.49; 95% confidence interval [CI] 1.65–3.75), conduct (aOR 1.54; 95% CI 1.03–2.32), and peer problems (aOR 1.58; 95% CI 1.02–2.45), and less optimal pro-social behavior (aOR 1.55; 95% CI 1.05–2.23). The independent association between HFI and hyperactivity was not found to be statistically significant (aOR 1.48; 95% CI 0.97–2.23).

Interactions of HFI with gender ($P = .855$) and of HFI with free/reduced-price school lunch ($P = .369$) with regard to parent and self-reported MH were not significant.

Discussion

This study utilized data from a nationally representative survey of children in the United States and demonstrated

Table 1. Factors Associated With Household Food Insecurity and With Problems With MH, 2007 (8th Grade) Wave of Early Childhood Longitudinal Study–Kindergarten (n = ~8600)

Characteristic	n (%)	Food Insecurity		Problems With MH	
		%	*P*	%	*P*
Age			.2042		.012
12.33 to 15.07 y	8263 (97.1)	10.0		10.6	
15.08 to 16.90 y	173 (2.9)	15.3		21.1	
Gender			.277		<.001
Male	4464 (52.2)	9.6		13.6	
Female	4345 (47.8)	10.8		8.5	
Race/ethnicity			<.001		.876
Black (non-Hispanic)	841 (17.3)	16.8		11.5	
Hispanic	1501 (18.4)	13.3		11.8	
White	5509 (57.1)	7.1		10.9	
Other	948 (7.2)	12.1		9.9	
Grade level			<.001		<.001
Below 8th/ungraded	833 (13.0)	15.5		18.7	
8th grade	7952 (86.7)	9.4		10.0	
9th grade or above	24 (0.3)	4.6		7.7	
Poverty status			<.001		<.001
Below poverty threshold	1445 (21.2)	29.8		18.2	
At or above poverty threshold	7364 (78.8)	5.0		9.3	
Maternal age			.558		.120
<30 y	445 (7.2)	10.5		10.6	
30–47 y	6737 (76.9)	10.4		10.7	
>47 y	1627 (15.9)	8.9		13.8	
Parent marital status			<.001		<.001
Married	6568 (68.8)	5.6		9.1	
Not married	2216 (31.2)	20.5		15.6	
Highest degree earned by parent			<.001		<.001
Less than high school diploma	624 (8.5)	23.7		19.8	
High school diploma/equivalent	4501 (55.2)	12.8		12.3	
Bachelor's degree	2159 (21.9)	3.7		7.7	
Master's degree/doctorate	1525 (14.4)	2.3		7.0	
Parent health status			<.001		<.001
Excellent/very good/good	7590 (86.7)	7.6		9.2	
Fair/poor	901 (13.3)	27.2		24.5	
Parent depressed			<.001		<.001
No	7298 (84)	6.7		8.6	
Yes	1179 (16)	28.5		24.5	
Free/reduced-price school lunch			<.001		<.001
No	6129 (64.4)	3.4		8.7	
Yes	2485 (35.6)	22.5		15.7	
School safety			<.001		<.001
Safe	8016 (91.6)	9.4		21.0	
Unsafe	628 (8.39)	18.7		10.2	
Neighborhood safety			<.001		<.001
Safe	6908 (77.4)	7.5		9.8	
Unsafe	1779 (22.6)	19.2		16.0	
No. of stressful life events			<.001		<.001
0	4278 (45.4)	4.7		7.6	
1	2602 (30.3)	9.9		12.8	
≥2	1723 (24.3)	20.8		15.9	

MH indicates mental health.

that exposure to HFI is independently associated with a more than 2-fold increase in risk of parent-reported MH problems of adolescents. This finding is particularly concerning, given the fact that at least 1 in 5 US households with children <18 years old is food insecure, and an even higher percentage of children and families living in poverty are food insecure.[2]

MH disorders have profound negative impacts on health and functioning, and contribute to substantial economic costs. In the United States, it has been reported that more than 20% of adolescents have MH disorders.[25] The prevalence of MH disorders is even higher among individuals from disadvantaged backgrounds.[26] Food insecurity, however, is not a risk factor that is typically acknowledged in standard MH assessments or treatment programs designed for disadvantaged populations.

Our study findings are consistent with and expand on the findings from the few published studies in this area which have reported that adolescents from food-insecure/food-insufficient homes may be more likely to have depression, dysthymia, and suicidal ideations,[15] adjustment problems,[14] substance abuse,[27] and difficulty getting

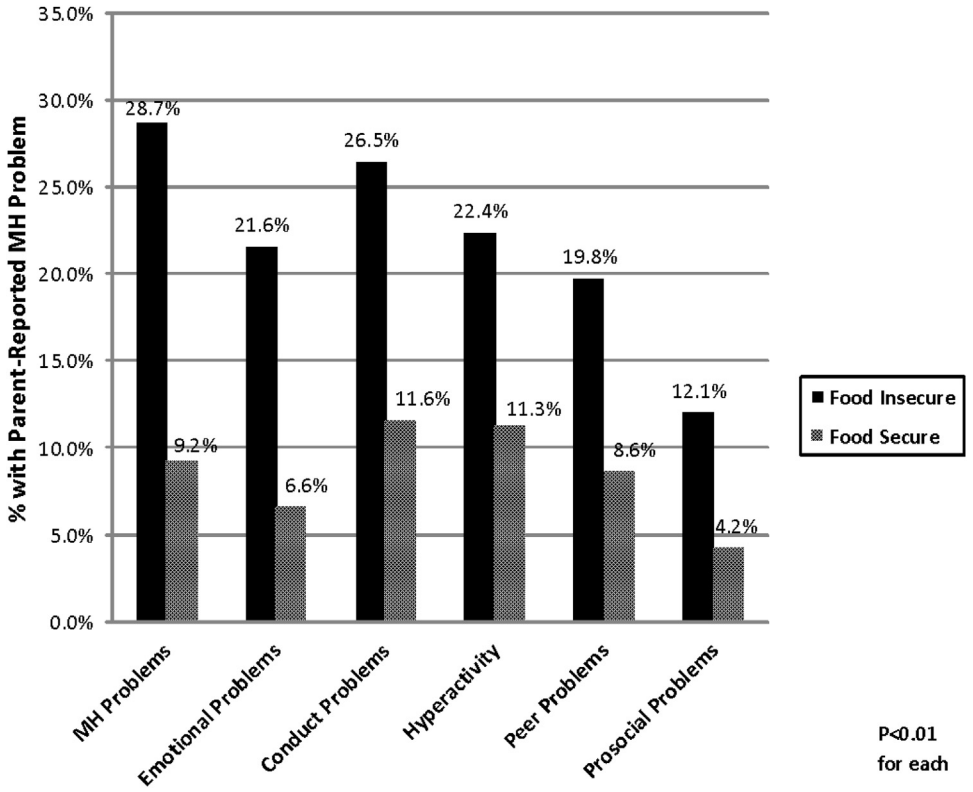

Figure. *Parent-reported mental health problems among adolescents with household food insecurity versus peers; 2007 (8th grade) wave of Early Childhood Longitudinal Study–Kindergarten (n = ~8600, weighted to ~3,944,000).*

along with peers,[6] and they may also be more likely to have been seen by a psychologist and to have been suspended from school.[6]

It is of note that the proportion of adolescents in the 2007 wave of the ECLS-K living in households with food insecurity was similar, though slightly lower than expected based on cross-sectional annual data on the prevalence of HFI from the US Department of Agriculture in 2007 (10.2% vs 11.1%).[18] Similarly, compared with data on 11- to 14-year-olds from the 2001 National Health Interview Survey, which included the SDQ as a measure of MH, in this study, a somewhat lower proportion of adolescents (11.2% vs 14.3%) was found to have parent-reported problems with MH (SDQ >13).[28] We suspect that in this school-based cohort, families with fewer resources may have been more likely to have been lost to attrition before the 2007 wave of the study, and this may account in part for the slightly lower than expected proportions of adolescents in food-insecure households and with problems with MH. In the ECLS-K, weighting procedures were used to minimize nonresponse bias[17]; however, it is possible that some of this bias may remain.

On the basis of previous research, we suspected that HFI may influence various aspects of MH,[6,14,15,27] and as expected, after adjustment for confounders, we did find significant problems with MH across multiple domains among adolescents with HFI.

In bivariate and multivariable analyses, we found that male adolescents had significantly higher rates of problems with MH as reported by their parents on the SDQ. This is consistent with findings from the 2001 National Health Interview Survey, which also used this measure.[28] The SDQ consists of various subscales (emotional symptoms, conduct problems, hyperactivity, peer problems), many of which reflect externalizing problems. These subscales are summed to create a Total Difficulties score, which we used to assess problems with adolescent MH. It has been reported that male adolescents are more likely than female adolescents to exhibit externalizing behaviors and to have higher rates of certain MH disorders such as attention-deficit/hyperactivity disorder and conduct disorder.[25] This could explain why, when using this scale, we found a higher rate of problems with MH among male adolescents. Although we did find that male adolescents had an increased risk of MH problems, we did not find that the association of food insecurity varies by gender with regard to the MH outcome that was studied. Gender differences in the experience of food insecurity, especially with regard to adolescent MH, have not been well explored, and further research in this area is necessary.

We had conjectured that receipt of free/reduced-price school lunch may alter the relationship between food insecurity and MH, perhaps by providing students with consistent access to nutritious food, thus improving the child's nutritional intake, and by minimizing uncertainty and psychological stress surrounding access to food, thereby buffering some of the biological and psychological stress that exposure to food insecurity has been postulated to cause. Our study did not demonstrate this to be true. There are several of possibilities why, contrary to our hypothesis, receipt of free/reduced-price school lunch did not attenuate the relationship between food insecurity and MH. We

Table 2. Factors Independently Associated With Problems With Mental Health in Multivariable Analyses, 2007 (8th Grade) Wave of Early Childhood Longitudinal Study–Kindergarten (n = ~8018)

Characteristic	aOR	95% CI
Child Characteristics		
Age		
12.33 to 15.07 y	…	…
15.08 to 16.9 y	1.49	.68–3.25
Gender		
Male	1.69	1.35–2.13
Female	…	…
Race/ethnicity		
Black (Non-Hispanic)	.56	.33–.94
Hispanic	.82	.54–1.25
White	…	…
Other	.90	.53–1.54
Grade level		
Below 8th grade/ungraded	1.63	1.14–2.33
8th grade	…	…
9th grade or above	1.05	.22–4.94
Body mass index, kg/m^2	1.01	1.00–1.03
Family Characteristics		
Poverty status		
Below poverty threshold	.96	.67–1.38
At or above poverty threshold	…	…
Maternal age		
<30 y	.70	.36–1.34
30–47 y	…	…
>47 y	1.51	1.03–2.22
Marital status		
Married	…	…
Not married	1.20	.83–1.75
Parent highest education		
Less than high school diploma	1.34	.70–2.57
High school diploma/ equivalent	1.37	.89–2.10
Bachelor's degree	.99	.62–1.60
Master's degree/doctorate	…	…
Parent health status		
Excellent/very good/good	…	…
Fair/poor	1.67	1.16–2.36
Parent depressed		
Yes	1.97	1.44–2.71
No	…	…
Food security status		
Food secure	…	…
Food insecure	2.30	1.62–3.27
Free/reduced-price school lunch		
No	…	…
Yes	1.01	.72–1.40
Environmental Characteristics		
School safety		
Safe		
Unsafe	1.71	1.18–2.48
Neighborhood safety		
Safe	…	…
Unsafe	1.22	.87–1.68
Stressful life events		
0	…	…
1	1.65	1.25–2.19
≥2	1.47	1.01–2.01

aOR indicates adjusted odds ratio; CI, confidence interval.

suspect that participation in the school lunch program may be beneficial for some adolescents with food insecurity, but for others, receiving free/reduced-price school lunch may be stigmatizing[29] and may thus actually compound social isolation and stress, ultimately contributing to problems with MH. For teens who attend schools in which participating in the school lunch program is considered the social norm, it may be that the school lunch provided is not sufficient to combat the psychological stress or adverse nutritional consequences associated with food insecurity—factors that may also contribute to problems with MH. Because receipt of free/reduced-price school lunch is parent reported, it is also unclear whether the reports are accurate—that is, whether adolescents are actually obtaining and eating the lunches they are eligible to receive. Although this study was not designed to explore the effectiveness of food supplementation programs on alleviating the effects of food insecurity, further study in this area could be useful in developing public policy to meet the needs of children and families who are living with food insecurity.

There are several limitations to this study. First, because this is a cross-sectional analysis of data, causality cannot be directly inferred, although other studies suggest that the causal relationship may be from food insecurity to problems with health and development.[3,7] Also, there is potential for unmeasured or unmeasurable confounders that may account in part for the relationships that we found. The fact that both the dependent and independent variables are reported by the same parent may also account for part of the relationship, as it is possible that parents who are more likely to disclose problems with their children's MH may also be more likely to disclose food insecurity. In addition, because in this study adolescent MH was assessed on the basis of parental report, internalizing problems may have been underreported.[30]

Moreover, publicly available data in the ECLS-K do not include information on participation in the school breakfast program and thus did not allow us to tease out whether children were in a program in which it was normative for students to receive free/reduced-price school lunch, and in this study we did not investigate whether a family's participation in programs such as the food stamp program (Supplemental Nutrition Assistance Program, or SNAP) altered the association between food insecurity and adolescent MH.

Furthermore, although a recent study suggested that there may be differences between the association of chronic and acute food insecurity with regard to the health status of children,[3] it was beyond the scope of this study to control for possible effects of prior exposure to HFI during the prenatal period or early childhood. The aim of this initial study was to assess whether there was an independent association between concurrent HFI and adolescent MH, adjusting for important potential confounders that have not previously been tested, and now that this association has been established, it will be interesting to explore the longitudinal relationship.

Despite these limitations, to our knowledge, this is the first study utilizing data from a large and nationally representative survey and validated measures of HFI and MH[1,21] to explore the association between HFI and MH among adolescents, adjusting for important confounders such as parent depressive symptoms and stressful life events experienced by the family.

Overall, these data add to the growing understanding of the associations between HFI and child and adolescent health. Future longitudinal studies are necessary to determine whether relationships between food insecurity and problems with adolescent MH are causal, and to test the mechanisms by which food insecurity affects these outcomes. In addition, public health interventions aimed at reducing HFI and its implications should be further explored.

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