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Food Insecurity among Hispanic/Latino youth: Who is at risk and what are the health correlates?

Stephanie Potochnick, Ph.D.^{1,*}, Krista M. Perreira, Ph.D.², Julia I Bravin³, Sheila F Castañeda, Ph.D.⁴, Martha L Daviglus, M.D., Ph.D.⁵, Linda C Gallo, Ph.D.⁴, and Carmen R Isasi, M.D., Ph.D.⁶

¹Truman School of Public Affairs, University of Missouri

²Department of Social Medicine, University of North Carolina at Chapel Hill

³Department of Psychology, San Diego State

⁴Health Promotion and Behavioral Sciences' San Diego State

⁵Institute for Minority Health Research, University of Illinois Chicago

⁶Epidemiology and Population Health, Albert Einstein College of Medicine

Abstract

Purpose.—We examined the correlates and health implications of household food insecurity among Hispanic/Latino youth (ages 8-16), a high food insecurity-risk population.

Methods.—Using the Hispanic Community Children's Health/Study of Latino Youth (n=1,362) and bivariate and multivariate analyses, we examined the correlates of household and child food insecurity and very low food security. We assessed the influence of four sets of risk/protective factors— child demographic, acculturation, socio-economic, and family/social support. We then examined associations between food insecurity and four health indicators— BMI, diet quality, depression, and anxiety—and used modification effects to assess whether these associations differed by sex, age, household income, parent nativity, and acculturative stress levels.

Results.—We found high rates of food insecurity: 42% of Hispanic/Latino youth experienced household food insecurity and 33% child food insecurity. Moreover, 10% lived in a very low food secure household. Compared to their food secure peers, Hispanic/Latino youth in food insecure households experienced greater parent/child acculturative and economic stress, and weakened family support systems. Associations of food insecurity with health outcomes varied by sex, age, household income, parent nativity, and child acculturative stress levels.

* **Correspondence:** Please address correspondence to Stephanie Potochnick, Truman School of Public Affairs, University of Missouri-Columbia, 229 Middlebush Hall, Columbia, MO 65211-6100. potochnicks@missouri.edu. Phone: 573-882-2951. Fax: 573-884-4872.

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Conclusions.—Food insecurity is highly prevalent among Hispanic/Latino youth and has detrimental health implications, especially for girls, older youth, and youth experiencing acculturative stress. Reducing food insecurity and improving health among Hispanic/Latino youth will likely require comprehensive policies that address their multiple migration, familial, and economic stressors.

Keywords

food insecurity; Hispanic/Latino youth; health; depression/anxiety; BMI

The Trump Administration has proposed "public charge" regulations that could decrease immigrants' and their families' food assistance participation and increase food insecurity by an estimated one million immigrants [1]. These regulations aim to reduce immigrant participation in noncash public benefits (e.g., Supplemental Nutritional Assistance Program, SNAP) by denying legal permanent residency (i.e. a green card) to immigrant families who legally use these benefits [1,2]. Such regulations will likely increase food insecurity among Hispanic/Latino youth, with potential health implications. To identify factors that may lower the food insecurity risk and related health burdens of Hispanic/Latino youth, this study examines the correlates of food insecurity and health among youth in middle childhood and adolescence (ages 8-16).

In fact, Hispanic/Latino youth, particularly those with immigrant parents, already face significant household food insecurity risk, defined as not having access to nutritionally adequate food. Nationally, Hispanic/Latino families experience nearly twice the rate of food insecurity as non-Hispanic/Latino white families (19.1% and 10%),[3] and research consistently finds higher rates of food insecurity among children of immigrants, especially non-citizens.[4–6] Moreover, in food insecure households youth (age 8+) are often the first to experience food insecurity because families protect younger children [7].

Little is known, however, about which Hispanic/Latino youth are most affected by food insecurity, and which risk and protective factors influence food insecurity risk. Because of Hispanic/Latino youth's racial/ethnic minority status and immigration connections—over 60% are children of immigrants [8]—they experience unique challenges and have unique resources that may ameliorate or exacerbate food insecurity risk. For instance, Hispanic/Latino youth experience multiple acculturative (e.g., adjusting to new norms, family dynamics, and discrimination) and economic (e.g., low-income status, parental unemployment, and neighborhood isolation) stressors that can increase food insecurity risk [9–12]. Additionally, many immigrant Hispanic/Latino families are excluded from safety-net supports designed to combat food insecurity, either through direct exclusion (i.e. undocumented status and citizenship/residency requirements) or indirect "chilling effects" that stem from restrictive immigrant policies generating fear and confusion [6,13–15]. Consequently, many Hispanic/Latino youth and families have few resources to protect against food insecurity. However, research often finds a health advantage among children of immigrants partly due to their optimism/resilience, healthier diets, and strong family/social supports—protective factors that can potentially decrease food insecurity risk [9–12,16–18]. Taking advantage of a unique, large-scale dataset on Hispanic/Latino youth, our first

objective is to examine how acculturation factors, socioeconomic stressors, and family/social supports relate to household food insecurity risk and severity.

Evidence on the health implications of food insecurity among Hispanic/Latino youth is also limited. Most research on youth food insecurity and health is based on the experiences of all school-age children (ages 5-17) and does not disaggregate effects by nativity or race/ethnicity.^{8,9} This research indicates that food insecurity is positively associated with both externalizing (e.g., aggression) and internalizing (e.g., depression) problem behaviors [19,20] and, though evidence is mixed, positively related to Body Mass Index (BMI) and obesity [16,21–26]. Characterized as the obesity-food insecurity paradox, this positive association with BMI/obesity may be due to reduced diet quality among food insecure children [9,17,27,28]. Research also indicates that the health implications of food insecurity are greater when food insecurity is severe and often differ by sex, age, socioeconomic status and parent nativity [4,10,19,21,26]. Research has yet to examine the health implications of food insecurity among Hispanic/Latino youth specifically. Thus, our second objective is to examine the relationship between food insecurity and four health indicators— BMI, depression, anxiety, and diet quality—and to assess whether these relationships differ by sex, age, household income, parent nativity, and acculturative stress levels.

Methods

Data and Sample

The Hispanic Community Children's Health/Study of Latino Youth (HCHS/SOL) is a cohort study of 16,415 Hispanic/Latino adults selected from four major Hispanic/Latino settlement locations—Bronx, Chicago, Miami and San Diego—using probability sampling [29]. SOL Youth is an ancillary study that in 2012-14 identified a random sample of children ages 8-16 of HCHS/SOL participants, enrolled 1,466 children (82% of eligible) from 943 households, and interviewed each child and one caregiver in English or Spanish at an in-person clinic visit. The study combines measures of Hispanic/Latino background, acculturation experiences, and food insecurity with in-depth health information. Details about the study, approved by UNC-Chapel Hill and other IRBs, are published elsewhere [29]. After excluding missing data on independent variables (8%), the sample varied by outcome—BMI (1,362), Healthy Eating Index-2010 (HEI-2010) (1,350), anxiety (1,285), and depression (1,337). Analyses imputing missing data revealed no meaningful result differences (Appendix A).

Measures

Health Outcomes: We measured four health outcomes— BMI, HEI-2010, depression, and anxiety—collected from children. BMI (kg/m^2) was measured using height and weight data from clinic visits. Following standard cut-offs, we classified children as underweight (BMI <5th percentile), normal weight (BMI 6-84th percentile), overweight (BMI 85-94th percentile), and obese (BMI 95+ percentile). We used HEI-2010 to measure overall diet quality, which captures whether dietary patterns are compliant with the *2010 Dietary Guidelines for Americans*. Ranging from 0-100, a higher score indicates greater compliance/better nutrition [30]. Depression was measured using the Children's Depression Inventory

short-form (CDI-S, $\alpha=.75$), and anxiety using the Multi-Dimensional Anxiety Scale for Children (MASC-10; $\alpha=.68$). T-scores range from 0 to 100 with a score of 65 or more indicating at-risk children with above average symptoms of depression/anxiety. For statistical power, we modeled all health outcomes as continuous.

Household Food Insecurity: We used the 18-item USDA Food Security Survey Module, which is collected from caregivers, based on the past 12-months, and linguistically validated [31,32]. Following USDA standards, we created two binary measures of food insecurity to distinguish between who in the household (any child and/or adult vs. any child specifically) was affected by food insecurity: household food insecurity (1=affirm 3 or more items; 0=all others) and child food insecurity (1=affirm 2 or more child-specific items; 0=all others). We also created two binary measures to capture severe food insecurity resulting in hunger: very low household food security (1=affirm 8 or more items; 0=all else), and very low child food security (1=affirm 5 or more child-specific items; 0=all else) [31].

Child Demographic Factors.—We included child's sex, age, location, and country of heritage: Mexican, Central American, Dominican, Puerto Rican, Cuban, and other.

Acculturation Factors.—We measured several acculturation factors, including parent nativity (1=Foreign-born, 0=U.S.-born/U.S. territory), parent's language preference (1=Spanish; 0=English), and parent and child acculturative stress. Both the child and parent completed the 9-item acculturative-stress index developed by Gil and Vega [33] which captures conflicts related to language, culture, and discrimination. We averaged response items to create a 1-5 scale with higher scores indicating more acculturative stress ($\alpha_{\text{parent}}=.76$; $\alpha_{\text{child}}=.73$). For effect modifications, we defined high acculturative stress above the 50th percentile of the distribution.

Socio-Economic Factors.—We assessed parents' marital status (single, cohabitating, married), employment status (both employed, one employed, no employment), household income ($\leq \$20,000$; $\$21,000$ – $\$40,000$, and $>\$40,000$), and whether the family received any cash (i.e. TANF, SSI) or food/nutritional assistance (i.e. SNAP, WIC). We created a 0–4 economic stress scale based on whether parents experienced any of the following hardships in the past month: lack of phone service, eviction, inability to pay rent/mortgage, and inability to pay utilities ($\alpha_{\text{parent}}=.57$). We measured neighborhood disorder based on parent reports on whether five factors (e.g., assaults, gangs, or drugs) were a problem: (1) not, (2) somewhat, or (3) big. We averaged across items to create a 1–3 scale ($\alpha_{\text{parent}}=.88$).

Family and Social Support.—For family social support, we used the 12-item General Functioning scale from the McMaster Family Assessment Device, which assesses family functioning related to communication and understanding (e.g., in times of crisis we turn to each other) based on parent responses. Responses are averaged to create a 1–4 scale ($\alpha_{\text{parent}}=.77$) demonstrating stronger family functioning. For child social support, we calculated the average of the four-item friendship sub-scale from the Multidimensional Scale of Perceived Social Support; scale range is 1–4 ($\alpha_{\text{child}}=.76$).

Analysis

First, we examined the prevalence and severity of food insecurity. We then evaluated correlates of food insecurity by estimating: mean differences in demographic, acculturation, socio-economic and family/social support factors between Hispanic/Latino youth in food insecure versus secure households, and logistic regressions of food insecurity as a function of these factors. We accounted for multiple children in the same household within the clustering of the standard errors [29] and did not examine very low child food security due to its low incidence.

Next, we examined the relationship between food insecurity and health by estimating mean differences in health by food security status. We then estimated six ordinary least squares regressions where the beta coefficients show predicted changes in health for each one-unit change in the respective independent variable. We included unadjusted (i.e. bivariable) and adjusted (i.e. multivariable) models for each of the three food insecurity measures. Adjusted models included controls for all demographic, acculturation, socio-economic, and family/social support factors. Lastly, we examined whether sex, age (8-11 vs. 12-16), household income (<\$20,000 vs. ≥\$20,000), parent nativity, and child acculturative stress (low vs. high) modified the effects of household food insecurity on health. Parent acculturative stress interactions were not significant. Effect modification was tested by adding interaction terms one at a time to our adjusted model and conducting a Wald test for differences in food insecurity associations by each effect modifier. Because it is our broadest measure, we focused on household food insecurity. Analyses using our alternate food insecurity measures were similar. Using STATA v14, all analyses were weighted and adjusted for survey design.

Results

The Prevalence and Severity of Food Insecurity

The prevalence and severity of food insecurity was high among our Hispanic/Latino youth population compared to national averages (Figure 1) [3]. For Hispanic/Latino youth living in the four locations where SOL Youth data were collected, rates of food insecurity were almost double the national average for all U.S. households with children and sizably larger than that of all U.S. Hispanic/Latino households with children. Over 40% of Hispanic/Latino youth experienced household food insecurity and 33% experienced child food insecurity. Additionally, over 10% lived in very low food-security households where either an adult or child experienced hunger; almost 3% lived in households where children experienced hunger (i.e. very low child food-security).

Correlates of Food Insecurity

Table 1 highlights mean differences in demographic, acculturation, socio-economic, and family/social supports between food secure and insecure Hispanic/Latino youth. We found no or limited differences in sex, age, and Hispanic/Latino background by food insecurity status. However, across every food insecurity measure, we found that food insecure Hispanic/Latino youth experienced greater parent acculturative stress, had access to fewer

socio-economic resources, and had more limited familial supports than their food secure peers.

Our regression analyses further highlight these findings (Table 2). While there were no or limited differences in the odds of food insecurity by age, sex, and Hispanic/Latino background, parent acculturative stress was positively associated with each type of food insecurity and child acculturative stress was associated with child food insecurity. Additionally, youth with foreign-born versus U.S.-born parents had higher odds of experiencing child food insecurity. Finally, youth with Spanish-speaking parents had lower odds of experiencing very low household food security.

Regression analyses also confirmed positive associations between familial socio-economic stressors and food insecurity among Hispanic/Latino youth. Unemployment status, household size, low household income, and economic stress were positively associated with household and child food insecurity. Neighborhood disorder was a risk factor but only for very low household food security. Strong family functioning (but not child social supports) was negatively associated with all three food insecurity measures.

Health Outcomes by Food Insecurity

Table 3 results highlight overall health disadvantages among Hispanic/Latino youth. Aligning with national estimates, over one in four Hispanic/Latino youth were obese [12,34], about one in six faced at least one mental health challenge (depression or anxiety) [35], and average diet quality as measured by HEI-2010 was about 54, indicating poor diet quality [30]. Results also suggest that household food insecurity may be associated with these health disadvantages, especially when food insecurity is severe. Across all three food insecurity measures, Hispanic/Latino youth in food insecure versus food secure households reported a higher mean CDI score. Other health disadvantages were apparent in households where food insecurity directly affected children (i.e. child food insecurity) or was severe (i.e. very low food security). In these households, Hispanic/Latino youth had higher BMIs and tended to be overweight and not underweight.

The results in Table 4, Panel A, which reports bivariable and multivariable associations between food insecurity and health, again demonstrates significant unadjusted associations between food insecurity and health. Using each of the three food insecurity measures, food insecurity was positively associated with CDI scores in unadjusted models. This indicates greater depression symptoms among Hispanic/Latino youth in all food insecure households, no matter the type (i.e. household or child) or severity (low vs. very low). Additionally, we found positive unadjusted associations of both child food insecurity and very low household food security with BMI. However, after adjusting for correlates of food insecurity in the adjusted models, these associations were attenuated and became insignificant across all health outcomes (See Appendix B for full model).

Effect Modifications of Household Food Insecurity on Health

Though associations were not significant in the full sample, analyses of effect modifiers reveal important food insecurity and health associations among key Hispanic/Latino youth subgroups (Table 4, panel B). For ease of interpretation, we report total effects by stratum

for each effect modifier and graphical representations of significant effect modifications in Appendices C-F. Focusing on those where both a main effect and the Wald-test are statistically significant, we found that household food insecurity was associated with greater BMI among youth ages 12-16 (but not youth ages 8-11). With respect to mental health, food insecurity was positively associated with CDI scores among female (but not male) youth and positively associated with both CDI and MASC scores among youth experiencing high (but not low) levels of acculturative stress. Focusing on the remaining statistically significant Wald-test results, we found suggestive evidence that household food insecurity was associated with lower diet quality among youth with U.S.-born (vs. foreign-born) parents, higher BMIs for youth with lower (vs. higher) household income, and higher MASC scores for older (vs. younger) youth and youth with foreign-born (vs. U.S.-born) parents.

Discussion

This paper advances literature on food insecurity and health by examining the correlates of food insecurity and health among Hispanic/Latino youth—a child population with unique migration experiences that may exacerbate or ameliorate food insecurity risk and its adverse health implications. Using new data on food insecurity from four key metro areas housing nearly 46% of U.S. Hispanics/Latinos [36], we found high prevalence and severity of food insecurity among Hispanic/Latino youth: 42% lived in a food insecure household with significant food concern, and 10% lived in a very low food secure household where family members experienced hunger. Moreover, food insecurity in these households often directly impacted children: 33% of Hispanic/Latino youth lived in a household with child food insecurity, and 3% in households with very low child food security.

Double the national average, these food insecurity rates align with prior research on urban youth [37] and highlight the scope and severity of disadvantage among Hispanic/Latino families living in locations with high costs of living [9]. The cost of living in the Bronx, Chicago, Miami, and San Diego is 6% to 81% higher than the national average, with a high percentage of income needed for housing [38]. Thus, low-income families living in these locations have much less available to spend on food after meeting basic shelter needs. Given this heightened vulnerability, it is imperative for researchers and policymakers to understand the risk and protective factors that relate to the prevalence of food insecurity and health correlates among Hispanic/Latino youth.

We found significantly higher mean BMI and CDI scores among Hispanic/Latino youth experiencing household and child food insecurity. However, regression analyses indicated that these health and food insecurity correlations may be explained by co-occurring acculturation, economic, and family stressors. Compared to their food secure peers, Hispanic/Latino youth in food insecure households experienced greater parent and child acculturative stress, greater economic stress (i.e. low levels of parental employment, high economic hardship, and more single-parenthood), and a weakened family support system (i.e. lower family functioning). Once we controlled for these co-occurring stressors the associations between food insecurity and health were attenuated and became insignificant across all measures of food insecurity. This may be because the correlation between poor health and food insecurity was confounded by a common set of underlying acculturative,

economic, and family risk factors or because these risk factors mediated the relationship between food insecurity and health. Nonetheless, these results highlight the need to address the interconnections between food insecurity and other health-related social problems, particularly with longitudinal data that can address temporal ordering [37].

At the same time, our investigation of effect modification revealed that associations of food insecurity with health outcomes varied significantly by sex, age, and child acculturative stress levels. In particular, food insecurity was associated with greater BMI for older youth and youth with the lowest household incomes as well as poor diet quality for U.S.-born youth. These results may help clarify the food insecurity-obesity paradox. Though we did not have sufficient power to consider a 3-way interaction, taken together the results suggest that poor diet quality and weight gain may only be associated with food insecurity among older Hispanic/Latino youth with low-income, U.S.-born parents. This result is consistent with research showing that foreign-born Hispanic/Latino parents help keep their children from adopting less healthy U.S. dietary habits [9,11,17] and that parental influences on the dietary habits of their children may weaken as their children age [3,23]. Future research should be undertaken to further investigate the food insecurity-obesity paradox by age, sex, and nativity.

Our effect modification results also showed that together food insecurity and acculturative stress negatively influenced Hispanic/Latino youth's mental health. Food insecurity was positively associated with depression and anxiety when children's acculturative stress was high and, in the case of anxiety, for girls and children of immigrants. This finding is consistent with previous research showing that stress can moderate the association between food insecurity and health, possibly by affecting parenting behaviors and youth coping mechanisms [26,39,40].

Additionally, for children of immigrants access to food assistance programs (e.g., SNAP) and related services, which have been shown to reduce food insecurity [31], may be hindered by policies explicitly excluding some foreign-born parents from benefits or leading foreign-born parents to forgo benefits for their children because they fear contact with government officials [6,13–15]. Overall, the challenges associated with migration (e.g., social exclusion, adapting to new social and familial norms, and experiencing discrimination) may hinder their ability to effectively rely on alternative sources of support (e.g., schools and peers) to minimize food hardship [12,18]. Thus, the alleviation of health burdens associated with food insecurity among Hispanic/Latino youth will require the development of policies that address the unique migration and acculturation experiences of these youth and their families. These policies may be particularly important for older-aged youth (age 12–16), since they faced more food insecurity health risks than younger-aged youth (age 8–11). Because parents with few resources may direct those resources to younger children first, older children may be less protected from household food insecurity [7].

Limitations

Though the SOL Youth data provide a unique opportunity to evaluate associations between food insecurity and health while controlling for a variety of acculturation, economic, and family stressors, the limitations of the data also offer some directions for future research.

First, because our data are cross-sectional, we cannot assess causality or the long-term health implications of food insecurity, which may not appear until after multiple years of exposure or until early adulthood [20]. Future longitudinal studies are needed. Second, our analysis is limited to four locations with high costs of living but also long histories of welcoming immigrants and providing resources to support their adaptation to the U.S. Future studies should consider other contexts, particularly new immigrant destinations which have more limited immigrant-specific resources [9,12]. Third, though we found associations between food insecurity and health among particular subpopulations of Hispanic/Latino youth, we did not have sufficient data (e.g., individual child-specific food insecurity measures) to fully explore the biological and social/familial mechanisms leading to these associations. Thus, further research is needed to disentangle these mechanisms.

Implications

Our study finds astoundingly high food insecurity rates among Hispanic/Latino youth—a rate that is likely to increase as the current administration revitalizes immigration enforcement efforts and works to reduce immigrant safety net access [13]. Extant research has shown that these policies have a “chilling effect” on the Hispanic/Latino community, reduce SNAP participation, and increase even citizen children’s food insecurity [6,14,15]. The results of our study suggest that food insecurity generated by these policies could have detrimental health implications for many Hispanic/Latino youth. Policy efforts to reduce food insecurity and improve the health of these youth will require a reversal of course and comprehensive effort to address the multiple migration and economic stressors these youth face while also building on their familial strengths and cultural resources.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Implications and Contributions Statement

Hispanic/Latino youth face significant food insecurity and health risks that stem from the multiple migration, familial, and economic stressors they endure. Policy efforts to reduce food insecurity and improve the health of these youth should address co-occurring acculturative and economic stressors and build on protective familial and cultural supports.

Figure 1. Percent of Hispanic Children Living in Food Insecure Households by Type of Household Food Insecurity

Notes: All U.S. Household estimates are the 2014 USDA national-level estimates. SOL Youth estimates are from the Hispanic Community Children's Health/Study of Latino Youth. N/A indicates estimates are not available. Because the USDA does not provide confidence intervals for their estimates, we cannot test for statistical differences between sample means.

Demographic and Familial Characteristics of Food Secure and Food Insecure Children in HCHS/SOL- Youth

Table 1.

	Household Food Insecurity ^a				Child Food Insecurity ^a				Very Low HH Food Security ^a			
	FS	FI	SE	p	FS	FI	SE	p	FS	FI	SE	p
Child Demographic Factors												
Female (%)	49.4	48.8	(2.2)	0.87	49.8	47.9	(2.1)	0.61	49.0	50.6	(1.9)	0.73
Age	12.0	12.3	(0.1)	0.08	12.0	12.4	(0.1)	0.08	12.1	12.2	(0.1)	0.79
Hispanic/Latino Background (%)												
Mexican (ref. categ.)	51.8	46.3	(3.7)	0.24	49.8	48.7	(3.5)	0.82	51.8	30.4	(3.3)	0.00
Central American	6.8	7.9	(1.2)	0.56	6.4	8.9	(1.1)	0.18	6.5	13.2	(1.0)	0.06
Dominican	13.9	14.9	(2.3)	0.76	13.8	15.2	(2.1)	0.69	13.8	18.6	(1.9)	0.29
Puerto Rican	9.5	15.5	(1.6)	0.09	11.5	13.2	(2.0)	0.66	11.0	20.7	(1.7)	0.05
Cuban	5.8	5.2	(1.3)	0.69	5.7	5.3	(1.1)	0.79	5.6	4.9	(1.1)	0.78
Other	12.2	10.3	(1.6)	0.38	12.7	8.7	(1.5)	0.08	11.3	12.1	(1.2)	0.83
Acculturation Factors												
Parent foreign born (%)	80.4	77.2	(2.1)	0.39	77.2	82.8	(2.4)	0.16	80.2	69.4	(2.0)	0.07
Parent Prefers Spanish (%)	80.9	78.8	(2.4)	0.56	79.0	82.1	(2.4)	0.37	81.9	65.1	(2.0)	0.01
Child's Acculturative Stress	1.6	1.6	(0.0)	0.21	1.6	1.7	(0.0)	0.02	1.6	1.7	(0.0)	0.15
Parents' Acculturative Stress	1.6	2.0	(0.0)	0.00	1.6	2.0	(0.0)	0.00	1.7	2.2	(0.0)	0.00
Socio-Economic Stress Factors												
Parents' Marital Status (%)												
Married (ref. categ.)	59.7	45.4	(3.0)	0.00	58.2	44.4	(2.9)	0.01	56.1	33.1	(2.7)	0.00
Cohabiting	13.0	12.7	(2.0)	0.91	13.6	11.4	(1.9)	0.40	12.3	17.4	(1.6)	0.25
Single	27.4	41.9	(2.5)	0.00	28.2	44.2	(2.5)	0.00	31.6	49.5	(2.4)	0.01
Household Size	4.3	4.3	(0.1)	1.00	4.3	4.4	(0.1)	0.54	4.3	4.2	(0.1)	0.68
Parents' Employment (%)												
Two Employed (ref. categ.)	38.0	26.0	(3.2)	0.01	36.4	25.9	(2.9)	0.03	34.6	19.3	(2.6)	0.01
One Employed	51.7	47.9	(3.3)	0.40	51.7	46.8	(3.0)	0.33	51.4	39.3	(2.8)	0.06

	Household Food Insecurity ^a				Child Food Insecurity ^a				Very Low HH Food Security ^a			
	FS	(SE)	%/M	(SE)	FI	(SE)	%/M	(SE)	FS	(SE)	%/M	(SE)
No Employment	10.2	(1.6)	26.1	(3.4)	0.00	0.00	11.9	(1.7)	14.0	(1.7)	41.5	(6.0)
Household Income (%)												
<= \$20,000	44.1	(3.4)	62.7	(3.5)	0.00	0.00	45.5	(3.0)	49.2	(2.8)	74.4	(5.4)
\$21,000- \$40,000	30.7	(2.8)	33.4	(3.4)	0.52	0.52	32.0	(2.6)	32.9	(2.4)	23.3	(5.1)
> \$40,000 (ref. categ.)	25.2	(2.7)	3.9	(1.2)	0.00	0.00	22.5	(2.5)	17.9	(2.0)	2.3	(2.3)
No Health Insurance (%)	10.7	(1.8)	7.6	(1.7)	0.22	0.22	10.2	(1.6)	9.6	(1.3)	7.9	(2.6)
Any Public Assistance (%)	56.7	(3.0)	76.9	(2.9)	0.00	0.00	58.4	(3.0)	62.5	(2.4)	87.4	(4.0)
Parents' Economic Hardship	0.3	(0.0)	1.0	(0.1)	0.00	0.00	0.3	(0.0)	0.4	(0.0)	1.6	(0.1)
Neighborhood Disorder	1.5	(0.0)	1.7	(0.1)	0.00	0.00	1.5	(0.0)	1.5	(0.0)	2.0	(0.1)
Family and Social Support												
Strong Family Functioning	1.8	(0.0)	2.0	(0.0)	0.00	0.00	1.8	(0.0)	1.8	(0.0)	2.1	(0.0)
Child Social Support	1.8	(0.0)	1.8	(0.0)	0.39	0.39	1.8	(0.0)	1.8	(0.0)	1.8	(0.1)
Sample Size	789				573		901		1196		166	

Notes: Data weighted and adjusted for survey design; non-weighted sample Ns shown. The sample Ns are lower for Anxiety (N=1,285), Depression (N=1,337), & HEI-2010 (N=1,350) due to missing data. HCHS/SOL-Youth=Hispanic Community Children's Health/Study of Latino Youth. HH=Household. FS=Food Secure; FI=Food Insecure.

^aIndicates food secure and food insecure populations are significantly different at noted p-value; bolded if p<.05.

Table 2.

Correlates of household food insecurity, child food insecurity, and very low food security (Logistic Regression)

	Household (HH) Food Insecurity			Child Food Insecurity			Very Low HH Food Security		
	OR	(95% CI)		OR	(95% CI)		OR	(95% CI)	
Child Demographic Factors									
Female	0.9	(0.7 ,	1.3)	0.9	(0.6 ,	1.3)	1.0	(0.6 ,	1.5)
Age	1.0	(1.0 ,	1.1)	1.0	(1.0 ,	1.1)	1.0	(0.9 ,	1.1)
Hispanic/Latino Background (ref. Mexican)									
Central American	1.3	(0.6 ,	2.8)	1.1	(0.5 ,	2.4)	2.2	(0.7 ,	6.9)
Dominican	1.3	(0.6 ,	2.7)	1.4	(0.6 ,	3.2)	5.2	(1.7 ,	16.3)
Puerto Rican	1.2	(0.4 ,	3.2)	1.7	(0.5 ,	5.7)	2.3	(0.5 ,	10.2)
Cuban	1.8	(0.7 ,	5.0)	1.2	(0.4 ,	3.6)	1.3	(0.2 ,	8.6)
Other	0.9	(0.4 ,	1.9)	0.5	(0.2 ,	1.1)	1.4	(0.6 ,	3.6)
Acculturation Factors									
Parent foreign born	1.1	(0.5 ,	2.2)	3.2	(1.2 ,	8.5)	1.6	(0.4 ,	5.4)
Parent Prefers Spanish	0.6	(0.3 ,	1.2)	0.6	(0.3 ,	1.3)	0.2	(0.1 ,	0.4)
Child's Acculturative Stress	1.3	(0.9 ,	1.7)	1.5	(1.1 ,	2.0)	1.7	(1.1 ,	2.5)
Parents Acculturative Stress	2.6	(1.7 ,	4.1)	1.9	(1.3 ,	2.7)	2.6	(1.7 ,	3.9)
Socio-Economic Stress Factors									
Parents' Marital Status (ref. married)									
Cohabiting	0.9	(0.5 ,	1.6)	0.7	(0.4 ,	1.3)	1.6	(0.7 ,	3.6)
Single	1.3	(0.8 ,	2.2)	1.6	(0.9 ,	2.8)	1.3	(0.6 ,	2.7)
Household Size	1.2	(1.0 ,	1.3)	1.2	(1.1 ,	1.5)	1.2	(1.0 ,	1.6)
Parents' Employ. (ref. two employed)									
One Employed	1.1	(0.7 ,	1.8)	1.1	(0.6 ,	1.8)	1.6	(0.7 ,	3.8)
No Employment	2.2	(1.1 ,	4.5)	2.3	(1.1 ,	4.7)	4.0	(1.4 ,	11.3)
Household Income (ref. >\$40,000)									
<= \$20,000	5.6	(2.2 ,	14.3)	4.7	(1.7 ,	13.1)	3.2	(0.3 ,	32.5)
\$21,000- \$40,000	5.9	(2.5 ,	13.7)	4.3	(1.6 ,	11.5)	2.5	(0.3 ,	24.9)
No Health Insurance	0.6	(0.3 ,	1.2)	0.6	(0.3 ,	1.4)	1.2	(0.4 ,	3.3)
Any Public Assistance	1.1	(0.7 ,	1.8)	1.4	(0.8 ,	2.4)	1.5	(0.7 ,	3.5)
Economic Stress	2.2	(1.6 ,	3.0)	2.6	(2.0 ,	3.4)	3.3	(2.4 ,	4.4)
Neighborhood Disorder	1.4	(1.0 ,	2.0)	1.2	(0.8 ,	1.8)	1.8	(1.1 ,	2.9)
Family and Social Support									
Strong Family Functioning	0.5	(0.3 ,	0.8)	0.3	(0.2 ,	0.6)	0.3	(0.2 ,	0.7)
Child Social Support	1.2	(0.9 ,	1.5)	1.0	(0.8 ,	1.4)	1.2	(0.8 ,	1.7)
<i>Constant</i>	0.0	(0.0 ,	0.2)	0.0	(0.0 ,	0.3)	0.0	(0.0 ,	0.0)

Notes: Bold indicates statistically significant at $p < .05$ level. Data are from the Hispanic Community Children's Health/Study of Latino Youth and are weighted and adjusted for survey design; non-weighted sample N=1,362. Fixed effects for field center included. HH=Household.

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Notes: Data weighted and adjusted for survey design; non-weighted sample Ns shown. The sample Ns are lower for Anxiety (N=1,285), Depression (N=1,337), & HEI-2010 (N=1350) due to missing data. HC/HS/SOL-Youth=Hispanic Community Children's Health Study of Latino Youth. HH=Household; FS=Food Secure; FI=Food Insecure; BMI=Body Mass Index; HEI=Healthy Eating Index; CDI=Children's Depression Inventory; MASC=Multi-Dimensional Anxiety Scale.

^aIndicates food secure and food insecure populations are significantly different at noted p-value; bolded if $p < .05$.

Table 4.
Baseline and Interaction Associations of Food Insecurity with Youth's Health (OLS Regression)

	BMI		HEI-2010		CDI Score		MASC Score	
	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)
<i>Panel A. Baseline Associations with Hispanic/Latino Youth's Health</i>								
Household Food Insecurity								
Unadjusted	0.6	(-0.2, 1.3)	-0.1	(-2.1, 1.8)	1.4	(0.1, 2.7)	0.1	(-1.6, 1.8)
Adjusted ^a	0.0	(-0.9, 0.8)	0.4	(-1.5, 2.3)	0.7	(-0.7, 2.1)	-0.7	(-2.4, 1.0)
Child Food Insecurity								
Unadjusted	0.9	(0.1, 1.6)	0.7	(-1.5, 2.9)	1.7	(0.4, 3.0)	1.0	(-1.1, 3.1)
Adjusted ^a	0.4	(-0.4, 1.3)	1.0	(-1.1, 3.0)	0.8	(-0.6, 2.3)	0.0	(-2.1, 2.2)
Very Low HH Food Security								
Unadjusted	1.2	(0.0, 2.3)	-2.9	(-6.2, 0.3)	2.0	(0.1, 3.8)	0.3	(-1.6, 2.3)
Adjusted ^a	0.5	(-0.7, 1.7)	-1.9	(-5.1, 1.2)	0.4	(-1.8, 2.7)	-0.7	(-3.2, 1.7)
<i>Panel B. Interaction Associations with Hispanic/Latino Youth's Health</i>								
Model 1. Sex Interaction^a								
Female: Food insecure	0.3	(-1.0, 1.5)	0.8	(-1.7, 3.4)	3.3	(1.5, 5.2)	-0.9	(-3.1, 1.3)
Male: Food insecure	-0.1	(-1.2, 1.0)	0.7	(-2.2, 3.5)	0.4	(-1.2, 2.0)	-0.4	(-2.8, 1.9)
<i>Wald Test (P-value)</i>	0.27 (.60)		0.01 (.91)		10.9 (<.001)		0.12 (.73)	
Model 2. Age Interaction^a								
Ages 12-16: Food insecure	3.2	(2.1, 4.3)	-1.3	(-3.9, 1.3)	0.1	(-1.6, 1.8)	1.9	(-0.1, 3.9)
Ages 8-11: Food insecure	-0.2	(-1.3, 0.8)	-0.7	(-3.4, 2.0)	1.6	(-0.3, 3.4)	-1.2	(-3.4, 1.1)
<i>Wald Test (P-value)</i>	43.51 (<.001)		0.19 (.66)		2.740.10		6.64 (.01)	
Model 3. HH Income Interaction^a								
<\$20,000: Food insecure	1.1	(-0.2, 2.3)	1.0	(-1.4, 3.4)	-0.5	(-2.2, 1.3)	-2.5	(-4.9, -0.1)
>=\$20,000: Food insecure	-0.3	(-1.4, 0.8)	-0.6	(-3.5, 2.3)	0.5	(-1.3, 2.3)	0.1	(-2.3, 2.4)
<i>Wald Test (P-value)</i>	5.40 (.02)		1.02 (.31)		1.02.31		2.64 (.10)	
Model 4. Parent Nativity Interaction^a								

	BMI		HEI-2010		CDI Score		MASC Score	
	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)
Foreign-born: Food insecure	0.6	(-0.7, 1.9)	1.6	(-2.3, 5.6)	1.5	(-0.7, 3.7)	1.8	(-1.2, 4.8)
US-Born: Food insecure	-1.0	(-2.5, 0.6)	-3.0	(-6.9, 0.8)	-0.5	(-2.9, 1.9)	-2.5	(-5.9, 0.9)
<i>Wald Test (P-value)</i>	2.83 (.09)		4.41 (.04)		2.35 (.13)		6.17 (.01)	
Model 5. Child Acculturative Stress^a								
High Acculturative Stress: Food insecure	-0.4	(-1.5, 0.8)	-0.6	(-3.2, 2.0)	4.5	(2.5, 6.5)	3.6	(1.5, 5.7)
Low Acculturative Stress: Food insecure	-0.8	(-1.9, 0.3)	1.9	(-0.8, 4.7)	0.0	(-1.6, 1.7)	-1.1	(-3.2, 1.0)
<i>Wald Test (P-value)</i>	0.50 (.48)		2.39 (.12)		20.86 (p<.001)		15.38 (p<.001)	

Notes: Bold indicates statistically significant at $p < .05$ level. Data are from the Hispanic Community Children's Health/Study of Latino Youth and are weighted and adjusted for survey design; non-weighted sample Ns are BMI (N=1,362), MASC Score (N=1,285), CDI Score (N=1,337), & HEI-2010 (N=1,350). Each column indicates the outcome and the reported coefficient for the food security measure reported.

^aModels adjust for demographic (child's age, sex, Hispanic background, & field center), acculturation (parent nativity, acculturative stress, and parent's language preference), SES (parents' marital status, employment, household income, health insurance status, public assistance receipt, and neighborhood disorder), and social support (family functioning and child social support) factors. HH=Household; BMI=Body Mass Index; HEI=Healthy Eating Index; CDI=Children's Depression Inventory; MASC=Multi-Dimensional Anxiety Scale.