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Student Hunger on Campus: Food Insecurity Among College Students and Implications for Academic Institutions

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Abstract

Purpose: To estimate the prevalence of food insecurity among students at a large mid-Atlantic publicly funded university; examine the association between food insecurity, demographic characteristics, potential financial risk factors, and self-reported physical and mental health and academic performance; and identify possible risk factors for food insecurity.

Design: Cross-sectional survey.

Setting: Large, public mid-Atlantic university.

Participants: Two hundred thirty-seven undergraduate students.

Measures: US Department of Agriculture (USDA) 18-item Household Food Security Survey Module (HFSSM) and questions on demographics, student status, economic factors, housing stability, living arrangements, academic performance, and self-rated physical health and depression symptoms.

Analysis: Multivariate logistic regression analysis.

Results: Among students surveyed, 15% were food insecure; an additional 16% were at risk of food insecurity. Students who were African American, other race/ethnicity, receiving multiple forms of financial aid, or experiencing housing problems were more likely to be food insecure or at the risk of food insecurity (Adjusted Odds Ratio [AOR] = 4.00, 95% confidence interval [CI] = 1.83-8.71, *P* value < .0001; AOR = 5.26, 95% CI = 1.85-14.98, *P* value = .002; AOR = 3.43, 95% CI = 1.85-6.37, *P* value <.001; AOR = 8.00, 95% CI = 3.57-17.93, *P* value < .0001, respectively). Food secure students were less likely to report depression symptoms than at-risk or food insecure students.

Conclusion: Food insecurity among college students is an important public health concern that might have implications for academic performance, retention, and graduation rates. Universities that measure food insecurity among their students will be better positioned to advocate for policy changes at state and federal levels regarding college affordability and student financial assistance.

Keywords

food insecurity, college students, racial disparities, housing insecurity, mental health, academic performance, achievement gap, college affordability, student financial aid, campus wellness

Purpose

Food insecurity is a growing public health problem for college students, with significant potential for adverse effects on both physical and mental health and functioning.[1-6] Food insecurity is defined as, "limited or uncertain availability of nutritionally adequate and safe food or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" due to a lack of money or other resources[7,8] and is reported to have increased among the general US population as a result of the Great Recession.[4,9] More is known about the prevalence of food insecurity among the general population than among college students. The US Department of Agriculture (USDA) estimates

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that 12.7% of US households are food insecure.[10] Previous research has documented a myriad of negative physical and mental health consequences of food insecurity among adults including decreased nutrient intake, increased mental health problems and depression, diabetes, obesity, hypertension, poor sleep, and lower self-rated health.[4,11] In addition, food insecurity, hunger, or food insufficiency has been associated with lower academic achievement, behavioral and attention problems, and adverse psychosocial development among school-aged and teenage students.[6,12-16] This study builds on a small body of cross-sectional studies of students at specific US universities, some of which have linked food insecurity to lower grade point averages (GPAs), poorer health, and housing instability.[5,17-20] This study aims to (1) estimate the prevalence of food insecurity among students at a large mid-Atlantic publicly funded university; (2) examine the association between food insecurity and self-reported physical health, depression symptoms, and academic performance; and (3) develop multivariate models to identify possible risk factors for food insecurity. The study was undertaken as formative research to provide baseline data to inform a new campus-based initiative addressing student hunger via establishment of a campus food pantry.

Methods

Sample

We based our sample size calculation on significance level $\alpha = 0.05$, power of 0.90 and assumed prevalence of food insecurity between 10% and 20% (based on the lower end of the range found in earlier published campus-based studies),[21] and we estimated that at least 122 participants would be needed. Our sampling strategy conservatively aimed to recruit approximately 250 students from a total sampling frame of 27 000 undergraduate students within a public mid-Atlantic university. A convenience sample of 237 undergraduate students (62% response rate) was recruited to take the 10-minute Web-based survey during 8 regularly scheduled class sessions at 2 colleges within the university during the fall of 2015 via announcements that included the survey link. The classes were required courses for students majoring in family science, community health, or agriculture. Eligibility was restricted to individuals who were 18 years or older and currently enrolled as an undergraduate student. No incentives were offered. Institutional Review Board (IRB) approval and online consent were obtained.

Measures

The survey included questions on demographics, student status, economic factors (eg, personal and family income, financial aid), housing stability, living arrangements, academic performance, and self-rated physical health. Food security status was assessed via the USDA 18-item Household Food Security Survey Module (HFSSM).[22] The HFSSM measures a variety of conditions and behaviors as indicators of the presence and severity of food insecurity.[22] The HFSSM has been found to be valid and reliable in numerous previous studies.[23] The HFSSM responses were scored following USDA protocol[22] and collapsed into 3 categories: food secure (zero affirmative responses), at risk of food insecurity/marginal food security (1-2 affirmative responses), and food insecure (3+ affirmative responses) adapted from Chaparro et al.[24] Symptoms of depression were assessed via the validated Patient Health Questionnaire 9.[25] Sleep was assessed by asking, "On average, how many hours do you sleep per day?" Also included were questions on self-rated health, height, and weight.

Analysis

Bivariate comparisons were made between students in the 3 groups using χ^2 tests and analysis of variance. A series of multivariate logistic regression models was developed to evaluate the association between food insecurity and several suspected risk factors after adjustment for age, gender, and family income ($\alpha = 0.05$). Because of the modest sample size, for the multivariate analyses, the at-risk and food insecure groups were collapsed, yielding a dichotomous-dependent variable of food security status (ie, at risk for food insecurity or food insecure vs food secure). We collapsed students reporting Hispanic ethnicity, American Indian/Alaskan Native, and other race due to small cell sizes. Variables that were statistically significant in the bivariate analyses were included in the logistic multivariate models. All analyses were conducted using Stata 14.1.

Results

The prevalence of food insecurity among students surveyed was 15%, with an additional 16% being at risk of food insecurity. Among the food insecure, a subset of 15 (43%) students had indications of very low food security or food insecurity with hunger. Food insecure students were more likely to report inability to eat balanced meals (80%), eating less (69%), and being hungry (69%) because there wasn't enough money for food during the past year.

As shown in Table 1, at the bivariate level, off-campus living situation, financial independence, financial aid, use of university meal plans, employment, age, race, household income, and housing stability problems were all statistically significantly different between the 3 food security statuses (all P values $< .05$). Food security status was not associated with residency status or use of food assistance programs.

There were many indications that food insecure and at-risk students were in poorer health than food secure students (Table 1). For example, food insecure and at-risk students were more likely to report their overall health as fair, poor, or very poor and reported lower energy levels compared with food secure students. Food insecure students however reported more frequent depression symptoms (little interest, feeling down, feeling tired, poor appetite, and feeling bad about oneself) and that they experienced disruptions in academic work as a result of depression symptoms. These differences remain statistically significant after applying Bonferroni correction for multiple

Table 1. Sample Characteristics and Description of Health and Academic Performance Correlates Among Undergraduate Students, By Food Security Status.[a]

Characteristic	Total sample ($n = 237$)	Food secure ($n = 163$)	At risk ($n = 39$)	Food insecure ($n = 35$)	P[b]
Gender, %, male	19	20	13	23	.51
Age, years	20.69 (4.30)	19.94 (1.97)	21.67 (6.72)	23.05 (7.06)	.0001
Race/ethnicity, %					.002
American Indian/Alaska Native	1	1	0	3	
Black or African American	20	15	33	29	
White	49	58	28	34	
Asian/Native Hawaiian/Pacific Islander	22	23	23	20	
Hispanic (of any race)	6	2	13	14	
Other	2	2	3	0	
Receive any financial aid, %	64	57	79	74	.014
Off campus living, %	69	64	69	91	.006
On university meal plan, %	39	44	36	17	.011
Participation in food assistance programs during the past year,[c]%	5	4	3	11	.11
Employed, %, yes	61	54	74	77	.008
Average work hours per week	10.32 (12.18)	9.23 (12.35)	10.93 (11.69)	14.86 (11.33)	.07
Receive financial support from family, %	86	93	69	74	<.001
Household/family income, %					<.001
Under US$10 000	5	3	5	15	
US$10k-US$14 999	1	1	3	0	
US$15 000-US$19 999	1	1	3	0	
US$20 000-US$24 999	3	3	5	3	
US$25 000-US$29 999	2	0	5	9	
US$30 000-US$34 999	2	1	5	3	
US$35 000-US$39 999	3	0	5	15	
US$40 000-US$44 999	0	0	0	3	
US$45 000-US$49 999	1	1	3	0	
US$50 000-US$59 999	2	3	0	3	
US$60 000-US$69 999	3	3	8	0	
US$70 000 and above	58	67	38	38	
Housing instability, %	17	7	28	54	<.001
Sleep, hours/day	6.74 (1.14)	6.9 (1.16)	6.37 (0.94)	6.44 (1.08)	.0085
Self-rated health suboptimal,%	9	7	14	17	<.001
Energy level suboptimal,%	24	15	37	49	<.001
Depression symptoms, %					
Little interest or pleasure in doing things	43	34	46	77	<.001
Feeling down, depressed, or hopeless	43	34	51	71	.001
Trouble falling or staying asleep or sleeping too much	61	55	68	74	.018
Feeling tired or having little energy	80	75	92	89	.002
Poor appetite or overeating	56	50	65	69	.003
Feeling bad about yourself—or that you are a failure or have let yourself or your family down	47	38	65	66	<.001
Trouble concentrating on things, such as reading the newspaper or watching television	38	34	46	49	.399
Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	19	14	32	29	.024
Depression symptoms impact school, %	54	46	62	80	.001
GPA	3.05 (0.91)	3.06 (0.95)	3.19 (.73)	2.88 (0.92)	.39

Abbreviations: ANOVA, analysis of variance; GPA, grade point average; SD, standard deviation.
[a]Values are percentages or means (SDs).
[b]Overall statistically significant differences between the 3 food security statuses were determined by either 1-way analysis of variance or χ^2 tests.
[c]This included emergency food from church, food pantry/bank, or emergency kitchen; WIC; SNAP; or assistance from private organizations.

comparisons using χ^2 and Fisher exact tests. However, there was no statistically significant difference in self-reported GPA by food security status.

Even after adjusting for age, gender, and family income, students categorized as African American or other race/ethnicity were significantly more likely to be food

insecure or at risk than white students (AOR = 4.00, 95% confidence interval [CI] = 1.83-8.71, P value < .0001, and AOR = 5.26, 95% CI = 1.85-14.98, P value = .002, respectively). Additionally, receiving multiple forms of financial aid (AOR = 3.43, 95% CI = 1.85-6.37, P value < .001) and housing instability significantly (AOR = 8.00, 95% CI = 3.57-17.93, P value < .0001) increased the odds of being food insecure. Receiving financial support from family was associated with a decrease in the odds of food insecurity (AOR = 0.28, 95% CI = 0.12-0.67, P value = .004). Food insecurity status was not significantly associated with financial independence, student status, credit hours, years in school, living situation, employment, or having a university meal plan after adjusting for age, gender, and family income.

Discussion

Summary

Food insecurity among a convenience sample of undergraduate students attending a large mid-Atlantic publicly funded university was 15%, with an additional 16% at risk of food insecurity. These rates are higher than household food insecurity in the state (10.7%)[10] but within the lower range found at other universities.[5,17-20,24,26,27]

Adjusting for age, gender, and family income, students who were African American, other race/ethnicity, receiving multiple forms of financial aid or experiencing housing problems were more likely to be at risk or food insecure. Race/ethnicity has previously been reported to be related to food insecurity.[24] Although receiving financial support from family was shown to be protective against food insecurity—regardless of family income—the positive association between food insecurity and financial aid suggests that current financial aid might not be adequate to cover basic needs.[27]

We observed statistically significant differences in food security status between students living on campus versus off campus as well as those with housing instability (eg, difficulty covering rent). These findings are consistent with 1 prior study in which 24% of students reported both food and housing insecurity.[19] This raises concerns about the impact on academic performance. Students experiencing housing and food insecurity have been found to be at greater risk of not completing their studies.[5]

The present finding that food insecure students reported lower academic achievement is consistent with prior campus-based studies.[17,18,20] However, examining GPA as the only indicator of academic achievement might not capture all the nuances of food insecurity's impact on academics. Future studies should examine delayed graduation, discontinuous enrollment, and attenuation of academic goals as possible consequences of food insecurity.

The self-reported physical health problems and depression symptoms among the at-risk and food insecure students in our study are consistent with extant literature on health consequences of food insecurity.[3,4] Such health consequences have implications for university administrators because they represent another likely mechanism by which food insecurity might undermine important academic outcomes including GPA, retention, and on-time graduation.

Limitations

The cross-sectional nature of the study does not permit speculation about the causal direction of the relationships observed between food insecurity and academic performance, health problems, or other correlates. Determining whether food insecurity among the sample studied is a transient or stable phenomenon is not possible. Although the data from this study are self-reported, the survey was anonymous and we have no reason to believe that any under- or overreporting occurred. There is the possibility of selection bias caused by missing students who dropped out of school due to economic hardship or other reasons. We did not collect information on whether the participants were first-generation students or transfer students, which could provide insight regarding intervention targets. Our study did not collect information on student spending patterns/debt or knowledge about specific student support services that could provide insight into whether certain behaviors are associated with food insecurity. Although we used the validated USDA HFSSM to assess food insecurity among our sample, assessment of the psychometric properties of the HFSSM among college student populations has not been explicitly evaluated. This highlights the need for more research in this area, including the development of validated assessment tools to measure food insecurity among young adult college student populations.

Significance

Our study affirms individual observations about student hunger on campus and quantifies the burden of food insecurity among this population. Our analysis identified important predictors that can inform the operations of ongoing campus-based interventions aimed at ameliorating the underlying causes of food insecurity. For our student population, the causes are more likely related to financial need, which often intersects with racial/ethnic minority status. Institutional interventions aimed at addressing student financial need, especially among underrepresented minority and first-generation students, could be expanded to include food and nutrition education/outreach programs on how to shop for and prepare healthy low-cost foods. Our study adds to the diversity of existing campus-based studies and extends prior evidence that food insecure students are at increased risk of health, academic, and housing instability problems and thereby warrant attention and action by university officials to avert adverse impacts on retention and graduation rates.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Food insecurity among college students has the potential to negatively impact student success on campus as well as their health but very little data exist.

What does this article add?

We evaluated multiple correlates of food insecurity (eg, housing stability, physical health, depression symptoms, and academic performance), which is unique among the few existing studies.

What are the implications for health promotion practice or research?

The present findings are being used at this university to explore ways to expand the reach and impact of existing emergency food distribution and to inform decisions about restructuring residential dining programs. Our finding about housing instability highlights the importance of affordable housing for college students, to reduce the pressure on low-income students who must otherwise choose between rent and other necessities.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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