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Food Insecurity and Academic Disruption Among College Students

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Food insecurity is a growing problem among college students, but little is known about how it is related to academic outcomes. We analyze broad demographics of food insecurity at one institution and explore how food insecurity is associated with whether students have neglected their academics, reduced courses, or considered dropping out of college due to their finances. We then discuss programs that may support food insecure students.

Food insecurity is a serious concern for many college students and for faculty, student affairs professionals, and other educators who work with students. Recent research suggested that hunger negatively impacts students' education (Dubick, Mathews, & Cady, 2016). This article investigates college students' experiences of food insecurity and how food insecurity is associated with students' academic performance and academic disruptions, such as reducing their course load and neglecting school work. In discussing college student food insecurity, we contribute to the conversation about the expanding and shifting role of student affairs as the support that students require changes. In this particular case, the change is students' need for food that they may not be able to procure elsewhere.

Food insecurity is defined by the United States Department of Agriculture (USDA) and researchers as "limited or uncertain availability of nutritionally adequate and safe foods or uncertain ability to acquire acceptable foods in socially acceptable ways" (Anderson, 1990, p. 1560). Nationally, 14% of households in 2014 were considered food insecure, and 6% experienced very low food security; this represents over 48 million Americans (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2015). Feeding America, a nationwide network of food banks, has estimated that 1 in 10 of their 46.5 million clients were post-secondary students (Resnikoff, 2014; Weinfeld et al., 2014).

While researchers and nonprofits like Feeding America understand the prevalence of food insecurity nationally, little research examines the prevalence of food insecurity among post-secondary students specifically, but this is a growing area of study and concern. Estimates of the percentage of food insecure college students vary widely, from 12% to 59% across a wide number of states, types of institutions, and student demographics (Chaparro, Zaghoul, Holck, & Dobbs, 2009; Crutchfield, 2016; Freudenberg, Manzo, Jones, Tsui, & Gagnon, 2011; Gaines, Robb, Knol, & Sickler, 2014; Maroto, 2013; Patton-López, López-Cevallos, Cancel-Tirado, &

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Vazquez, 2014). Pell-eligible students, students of Color, and students at two-year institutions were more likely to experience food insecurity (Brotton, Frank, & Goldrick-Rab, 2014; Wisconsin Hope Lab, 2016). The disparities in the estimates of food insecurity are due in part to differences in how food security is measured across these studies. For example, some studies ask about students' food insecurity experiences in the past 30 days, others in the past 12 months (Chaparro et al., 2009; Dubick et al., 2016). There are also differences in the scope of the studies, ranging from single institution studies to multi-institutional studies focused on only two-year schools or only four-year schools. Regardless of the exact number of students who are food insecure, food insecurity has serious implications for students' success in college.

This article considers how food insecurity matters for students' college success by focusing on demographic differences in food insecurity among college undergraduates at a large, public, four-year midwestern university and analyzing how food insecurity is related to academic performance, measured by grade point average, and academic disruptions among students with debt. We focus on a large public university because these institutions serve a wide variety and large numbers of students. This article is the first to examine how food insecurity among college students is associated with negative academic outcomes among what might be a particularly vulnerable population, students with debt. By focusing on students with debt, their academic outcomes, and their food security status, we show how multiple sources of precarity may overlap in students' college experiences. Our research questions are:

1. What percentage of students on this campus are food insecure, and what demographic characteristics are associated with food insecurity?
2. How is food insecurity associated with students' consideration of academic disruptions and grade point averages on this campus?

These findings contribute to student affairs practitioners' understanding of food insecurity, a sometimes overlooked problem among college students. This research helps scholars and practitioners to understand students' resource constraints and to consider how to minimize these constraints' impact on academic achievement. Our goal is to increase awareness of this issue in higher education, to contribute to research on inequality on college campuses, and to discuss the ways in which student affairs has and can respond to this issue. The results of this study could inform targeted outreach initiatives for vulnerable students. We end with a discussion of efforts to alleviate food insecurity on campuses around the nation and recommendations to minimize food insecurity's impact on academic progress.

Literature Review

The research on food insecurity's impact on college educational outcomes is small, but growing. It builds on research in K–12 settings, which has shown that food insecurity is associated with an array of negative educational outcomes, such as lower math and reading scores, as well as behavioral issues, such as absenteeism and suspension (Alaimo, Olson, & Frongillo, 2001; Jyoti, Frongillo, & Jones, 2005; Kleinman et al., 1998; Murphy et al., 1998). Some researchers also suggest that food insecurity earlier in life has cumulative, negative consequences on later life outcomes (Cady, 2014). Approximately 20% of children under age 18 experience food insecurity (Proctor, Semega, & Kollar, 2016). Though programs such as the National School Lunch Program (NSLP) exist to mitigate food insecurity's negative impact on K–12 students, these programs do not support college students. Researchers need to understand how these trends translate into a college learning setting.

Researchers are beginning to understand that food insecurity matters for academic disruptions, like missing class and not buying textbooks (Dubick et al., 2016). Another study found that students who are food insecure are more likely to have lower grade point averages (GPA) than food secure students (Patton-López et al., 2014). While contentious as a measure of academic success, GPA nonetheless has consequences for students' ability to persist in college and to graduate.

Food insecurity among college students is not equally distributed. Many subsets of students are at risk for food insecurity, from veterans and graduate students to first-generation students and students experiencing personal emergencies (Cady, 2016a). While some research finds that students of Color are more likely to experience food insecurity, Patton-Lopez and colleagues (2014) did not find significant differences in food insecurity among Latino and non-Latino students. Further, socio-economically disadvantaged students may be at greater risk for food insecurity (Broton et al., 2014). The demographics of food insecurity are not yet understood fully.

While recent studies outlined rates of food insecurity and who might be food insecure, there is only one study to our knowledge that examined food insecurity and academic outcomes. This study found that 86% of students who experience food or housing insecurity reported that they had done one of the following because of their hunger or housing issues: missed a class, study session, or club meeting; opted not to join a cocurricular activity; did not purchase a textbook; or dropped a class or did not perform as well as they could have in their academics (Dubick et al., 2016). The same study also found that 25% of students dropped a class because of hunger or housing problems (Dubick et al., 2016). Our study extends these findings by examining how food insecurity is associated with academic disruptions as well as students' GPA. In doing so, we explore the impact of food insecurity on key components of students' educational success and progress.

Research on food insecurity also needs to consider other aspects of students' financial well-being as it relates to their educational success, such as debt. With increasing concerns about student loan debt and the rising costs of college (Dwyer, McCloud, & Hodson, 2012), it is important to understand how students' financial situations may be related to their food insecurity status. Students with debt represent a large proportion of college students. Across sectors, in 2014 about 69% of students graduated with a bachelor's degree with some student loan debt, with an average debt load of \$28,950 per borrower (Cochrane & Reed, 2015). Our research specifically considers the food insecurity levels of students with any kind of debt for some analyses.

Many students may take on debt not only to pay for tuition but also to pay for room and board, either on campus or off-campus. The College Board (2014) reported that in 2014–2015, the average cost of on-campus room and board was nearly \$10,000 at four-year public schools. The average off-campus living cost allowance reported by public colleges and universities was \$12,080 in 2013–2014 (Kelchen, Hosch, & Goldrick-Rab, 2014). It is important to note that living cost allowances vary widely and may not accurately reflect the real cost of living in a particular area, yet they dictate the amount of student loans for living expenses available to students (Kelchen et al., 2014). Most students (87%), live off-campus (Kelchen et al., 2014). Fifty percent of undergraduate students live off-campus but do not live with family, compared with 37% of off-campus students who live with family (Kelchen et al., 2014). This 50% of undergraduates living off-campus and not with family may be particularly at risk of being low-resourced and make sacrifices in terms of food in order to balance other aspects of their budget. At the same time, some students living without family may be less vulnerable to food insecurity since they only need to care for themselves (Goldrick-Rab, 2016). Parsing apart these distinctions is an area for continued research. The financial hardships that may accompany paying for college

translate into competing financial demands between food and tuition, textbooks, housing, and health care. As they navigate these competing demands, college students may shift their academic decisions and expectations through behaviors like reducing their course load, neglecting their academic work, or considering dropping out. These behaviors can also impact GPA negatively.

By bringing together food insecurity, academic disruptions, and debt, this article aims to build on prior food insecurity research. It also examines demographic differences in food insecurity among students to provide scholars and practitioners a more complete picture of students experiencing food insecurity.

Data and Methods

Data for the study are from an online survey on student financial wellness that was distributed to a random sample of 5,000 currently enrolled undergraduate students of all class ranks at a large, urban, public, midwestern university in November 2014. The survey was originally piloted with 19 institutions in one state in 2010 and then opened to multiple institutions across the United States in 2014. In 2014, 50 institutions participated in the larger study, though only one incorporated the food security questions. This financial wellness survey was developed by institutional faculty and staff. It was validated over time through reliability and validity analyses, including factor analysis and cognitive interviews. While the focus of the survey was financial wellness, the intentional incorporation of a module of questions on food security permitted us to explore the ways in which students articulated their financial wellness around a basic need and whether students were able to meet that need on a regular basis.

These analyses include 508 students (a 10.2% response rate) who had complete information on all of the independent variables. For the full sample of 666 students, the response rate is 13.3%. The food security questions were at the very end of the survey, which may explain the drop off in responses. Some analyses include fewer students due to data constraints, which we discuss for each analysis that follows. The random sample of 5,000 students is about 11% of enrolled undergraduate students at this institution. Sampling error at the 95% confidence interval for the original sample of 5,000 students is 1.3%, and it is 3.8% for the sample of 666 students who participated in the study. Men are slightly underrepresented and women are overrepresented in the sample by about 10%. This is fairly typical in survey responses, as women are more likely to respond than men (Underwood, Kim, & Matier, 2000). Students of Color are slightly over-represented in our sample, particularly Asian or Asian American students (9.3% in the sample compared to 5.4% at the institution) and students who identified as multi-racial or another race (11.6% in the sample, 8.3% at the institution). Since other research on food insecurity suggests that students of Color are more likely to experience food insecurity, the over-representation of students of Color could impact our results. Given our low response rate, it is possible that certain groups of students may be more likely not to respond. We were only able to match institutional records to student respondents who consented to match their educational records to their survey data, so we are unable to explore any potential non-response bias more thoroughly.

Dependent Variables

Food insecurity is measured using the six-item food security instrument developed by the United States Department of Agriculture's Economic Research Service (USDA, 2012). [Figure 1](#) outlines the questions. Answer options in bold and italics indicate that this response was counted as an indicator of food insecurity.

Using the USDA guidelines to create an index of food insecurity, individuals were given a score of 1 each time their answers fell into one of the affirmative categories, those in bold and

Figure 1. Food security questions.

Q1. For these statements, please indicate the extent to which the statement was often true, sometimes true or never true for you or your household in the last 12 months.

	Never True	<i>Sometimes True</i>	<i>Often True</i>	Don't Know/Prefer not to Answer
The food that I bought just didn't last, and I didn't have money to get more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I couldn't afford to eat balanced meals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q2. In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes*
- No (Skip to Q5)
- Don't Know/Prefer not to Answer (Skip to Q5)

Only see Q3 if YES to Q2:

Q3. How often did this happen?

- Almost every month*
- Some months but not every month*
- Only 1 or 2 months
- Don't know

Q4. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

- Yes*
- No
- Don't Know/Prefer not to Answer

Q5. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes*
- No
- Don't Know/Prefer not to Answer

italics in Figure 1. This created an index that ranged from 0 to 6. We do not use this index on its own because the USDA does not recommend it. Higher scores on the index reflected greater food insecurity. Following USDA guidelines, responses were then recoded into the following three categories based on the students' total score: (a) food secure or marginal food insecurity—raw score 0–1; (b) low food security—raw score 2–4; (c) very low food security—raw score 5–6. See Table 1 for the percentage of students in each of these categories. Following USDA guidelines, these three categories are further condensed into a dichotomous variable for some analyses, with categories of food insecure (including low food security and very low food security respondents) and food secure (including food secure or marginally food insecure respondents). As a note on measurement, while first-year students' answers may reflect their pre-college experiences, when we compared the percentages of students experiencing food insecurity excluding first-year students, they are very similar, so we are confident in including first-year students in our measure because they are distributed across the food security categories.

Table 1

Food Security by Demographics

	Food Security Status			X ² test
	Secure	Low Security	Very Low Security	p-value
All Students	63.4%	21.9%	14.8%	
Gender				0.518
Male	65.8%	19.3%	14.9%	
Female	61.8%	23.5%	14.7%	
Race/Ethnicity				0.032
White	65.2%	21.4%	13.4%	
African American or Black	39.3%	25.0%	35.7%	
Asian or Asian American	70.2%	17.0%	12.8%	
Other race/multi-racial	57.6%	27.1%	15.3%	
Age				0.004
Traditional (age 18–23)	65.9%	20.6%	13.5%	
Non-traditional (age 24 or older)	43.9%	31.6%	24.6%	
Years enrolled in post-secondary education				0.060
1 year	71.3%	17.8%	10.9%	
2 years	62.8%	23.1%	14.1%	
3 years	65.8%	14.5%	19.7%	
4 years or more	57.4%	28.4%	14.2%	
First generation status				0.000
First generation student	47.3%	30.4%	22.3%	
Non-first generation student	70.0%	18.3%	11.7%	
Employment status				0.121
Full-time	51.5%	33.3%	15.2%	
Part-time	60.7%	23.1%	16.2%	
Not employed	70.4%	17.4%	12.2%	
Current debt				0.000
Currently has some form of debt	52.6%	27.8%	19.6%	
Does not currently have any form of debt	75.7%	15.2%	9.1%	
Don't know	75.0%	14.3%	10.7%	
Financially independent of parents/guardians				0.000
Yes	46.0%	25.6%	28.5%	
No	69.8%	20.5%	9.7%	
Responsible for financial dependents				0.000
Yes	20.8%	45.8%	33.3%	
No	65.5%	20.7%	13.8%	

(continued)

Table 1

(Continued)

	Food Security Status			χ^2 test
	Secure	Low Security	Very Low Security	p-value
Residence				0.000
On-campus	78.9%	13.6%	7.5%	
Off-campus, within walking distance	59.6%	25.3%	15.1%	
Off-campus, within driving distance	52.9%	25.0%	22.1%	
<i>n</i> = 508				
				f test P-value
Grade Point Average (mean)	3.36	3.18	3.11	0.003
<i>n</i> = 340				

This article also examines how food insecurity is associated with several attitudinal and academic outcomes. Cumulative GPA is used as a measure of students’ academic performance in college. GPA is the best measure in our data of students’ academic performance. At the beginning of the survey, students were asked to consent to share their educational records. For students who consented, cumulative GPA was accessed through the university for the semester in which the survey was completed, Autumn 2014. The GPA variable’s values range from 0.0 (one student) to 4.0, with an average of 3.3. Since not all students consented to share their education records, the analysis with GPA includes 340 students.

The attitudinal measures we draw on are shown in Figure 2. They included asking students if they had considered dropping a class, reduced their course load, or neglected their academics. Again, affirmative answers are bolded and italicized. Anyone who answered “sometimes” or “frequently” was coded as 1 in the recoded binary measure. Students who responded “not applicable” were excluded from analyses. For these analyses, the final sample is 432 students.

Independent Variables

We used demographic and student characteristics to predict food security status. Independent variables included students’ gender, race/ethnicity, age, first generation student status, whether the

Figure 2. Questions on academic disruptions.

Questions	Never	<i>Sometimes</i>	<i>Frequently</i>	N/A
1. Neglect: Has the amount of money you owe ever caused you to neglect your academic studies?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Reduce: Has the amount of money you owe ever caused you to reduce your class load?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Drop: Has the amount of money you owe ever caused you to consider dropping out of college/university?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

student reported that they had any current debt, whether the student was financially independent of their parent(s) or legal guardian(s), whether a student was financially responsible for children, a spouse or partner, or another family member, employment status, class rank, and residence. Table 1 presents each variable in the analysis and a description of how the variable was coded. We checked for multi-collinearity across all variables and found that the correlations between them are very small.¹ The Appendix includes a breakdown of independent and dependent variables in the sample and the institution as a whole.

To measure race/ethnicity, students were asked “what is your race/ethnicity?” and could select all applicable racial or ethnic identities. Recoded and combined categories included in these analyses are White or Caucasian, Black or African American, Asian or Asian American, and other or multi-racial identity. Hawaiian or other Pacific Islander, Hispanic or Latino(a), Native American, American Indian, Alaskan Native, Middle Eastern or Arab American, other, and multi-racial identity were combined due to small sample sizes.

First generation status represented whether a student reported that neither of their parents or guardians completed a four-year college degree and is derived from two variables asking the highest level of education their mother and father or legal guardian(s) completed.

The variable debt represented students’ responses to the question, “Do you currently have debt from any source, including student loans, credit cards, car loans, personal loans from financial institutions or from family/friends, or any other type of credit or loans?” Response options included yes, no, and I don’t know. We use this question for our measure of debt because it captures a more thorough picture of respondents’ debt situation beyond student loans only. The full sample of 666 students and the analytical sample of 508 students have the same debt characteristics.

While students’ self-reported answers are used for all independent variables, for gender, race/ethnicity, class rank, and age, if a student did not respond, information from the university’s information system was used to replace missing data for students who consented to sharing their educational records.

Analytic Strategy

To examine descriptive differences in food insecurity, we performed a chi-square test of independence to examine the relationship between each demographic variable and food security status. Next, we used an analysis of variance test of GPA and food security categories. These baseline analyses allow us to begin to understand the relationship between food insecurity, demographic characteristics, and academic attributes. Then, we conducted a logistic regression analysis to examine food insecurity with the demographic variables as predictors. We used logistic regression analysis because our demographic variables of interest and our dependent variable were categorical variables. This analysis gives us a greater understanding of the demographic predictors of food insecurity. We then used a logistic regression analysis to investigate attitudes about considering dropping out, reducing course load, or neglecting academics among students with debt, with food insecurity as an independent variable. Agresti (2007) recommended having 10 events per independent variable, though Vittinghoff and McCulloch (2007) found through a simulation study that it is possible to relax the 10 event assumption for logistic regression. We relaxed this assumption for our logistic regressions to include theoretically important independent

¹ We ran a correlation matrix and estimated variance inflation factors post-analysis to determine that multi-collinearity is not impacting our results.

variables in understanding student food insecurity. Additionally, for both logistic regressions, we used odds ratios for easier interpretability. Last, we employed an ordinary least squares (OLS) regression to examine food insecurity's impact on GPA. We used GPA as the dependent variable because it is the strongest indicator of academic success that is available in the data.

Results

Following the USDA categories, 63.4% of the sample of 508 students was food secure, 21.9% experienced low food security, and 14.8% experienced very low food security (see [Table 1](#)). As a comparison, in the state where the university is located, on average in 2012–2014, 16.9% of individuals were considered to have low or very low food insecurity combined, and 7.5% of the population had very low food security (Coleman-Jensen et al., 2015).

[Table 1](#) presents food insecurity by major demographic characteristics. There were no statistically significant differences in food insecurity by gender, years enrolled in postsecondary education, or employment status. There were statistically significant differences by race/ethnicity, age, first generation status, whether a student had any current debt, whether they were financially independent, and whether they were financially responsible for children and residence. African American students were more likely to be food insecure than students of other races or ethnicities ($p < 0.05$). First generation students, non-traditionally aged students (24 or older), more advanced students, students carrying current debt, students who were financially independent, students with children, and off-campus residents were more likely to be food insecure (all $p < 0.01$).

[Table 2](#) presents a logistic regression of demographic factors predicting whether students experienced food insecurity.² Food insecurity here is a dichotomous variable (high or marginal food security and low or very low food security). There were not statistically significant differences in food insecurity based on gender, employment status, age, or class rank. African American students had 2.90 times greater odds of experiencing food insecurity compared to White students. There were no statistically significant differences between Asian or Asian American and White students or other and multi-racial students and White students. First generation students had 1.72 times greater odds of being food insecure than non-first generation students. Students who were financially independent of their parents had 2.18 times greater odds of experiencing food insecurity than dependent students. Students who were financially responsible for other(s) (e.g., spouse, children) had 4.89 times greater odds of being food insecure. Students who currently had any form of debt had 2.15 times greater odds of experiencing food insecurity compared to students without any debt; yet students who did not know whether they currently had debt did not differ significantly in their food security status compared to students without any debt. Students living off-campus within walking distance of the university had 2.92 times greater odds of being food insecure, and students living outside of walking distance of the university had 2.38 times greater odds of being food insecure.

[Table 3](#) shows the impacts of academic disruptions. The sample is restricted to the 432 students who answered all three academic disruption questions for clarity. The models are logistic regressions. Model 1 suggested that students with experiences of food insecurity had 3.49 times greater odds of reporting that they had considered dropping out of college due to the money they owed than their food secure counterparts. Model 2 found that food insecure students had 3.58 times greater odds of reporting that they had reduced their course load due to the amount of money they owed. Model 2 also suggested that students who work full time had 6.87 times greater odds of reporting that they

² Results were similar in analyses using multinomial logistic regression examining very low and low food security separately compared to being food secure. For ease of presentation and interpretation, we used logistic regression.

Table 2

Logistic Regression of Demographics on Food Security

	b (s.e)	Odds Ratio
Female (ref. male)	0.085 (0.211)	1.089
Race/Ethnicity (ref. White)		
African American	1.065* (0.452)	2.902
Asian or Asian American	-0.114 (0.376)	0.892
Other race/multi-racial	0.180 (0.316)	1.200
Employment Status (ref. not employed)		
Full-time	-0.283 (0.453)	0.753
Part-time	0.104 (0.236)	1.110
First generation student	0.545* (0.234)	1.724
Financially independent of parents/guardians	0.779** (0.248)	2.18
Financially responsible for other(s)	1.586** (0.575)	4.890
Currently have debt from any source, including credit card debt, car loans, and personal loans (ref. no debt)		
Yes	0.767*** (0.225)	2.152
Don't know	0.280 (0.488)	1.323
Traditionally aged college student (18–24)	0.464 (0.403)	1.591
Academic level (ref. First-year)		
Second year	-0.058 (0.333)	0.943
Third year	-0.575 (0.368)	0.562
Fourth year or more	-0.229 (0.361)	0.795

(continued)

Table 2

(Continued)

	b (s.e)	Odds Ratio
Residence (ref. on-campus)		
Off-campus, within walking distance	1.072*** (0.312)	2.922
Off-campus, outside of walking distance	0.869** (0.335)	2.384
Constant	-1.778*** (0.532)	
McFadden's R ²	0.128	
Cragg & Uhler (Nagelkerke) R ²	0.212	
BIC	-2446.008	
<i>n</i> = 508		

Standard errors in parentheses.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

reduced their course load than students who were not working full time. Similar to the other models, Model 3 suggested that students experiencing food insecurity had 3.42 times greater odds of reporting neglecting their academic studies due to the money they owed than food secure students. Model 3 also suggested that students who were employed part time or full time also had greater odds of neglecting their studies (odds ratios 3.51 and 4.64, respectively).

Table 4 shows the impact of food insecurity on GPA using OLS regression. The sample for the model in Table 4 is 340 students because it includes only students who permitted researchers to access their education records. Food insecurity is associated with lower GPAs, such that being food insecure is associated with a 0.17 points lower GPA than food secure students.

Limitations

Limitations of this study include the single institution sample and the small sample size. These constraints limit generalizability beyond this institution. The sample paring that was required for the regression analyses is also a limitation of the study. Future research using the same USDA measure of food insecurity should continue to examine the prevalence of food insecurity across other types of institutions, across a wider variety of students, and in other locations. Additionally, measuring student food insecurity over time could help researchers make more causal claims about the relationship between food insecurity, academic disruptions, and, ultimately, student success.

Discussion and Conclusion

In sum, students with a variety of constraints and underrepresented backgrounds in college were more likely to experience food insecurity. Students with debt and experiences of food insecurity were more likely to consider or experience academic disruptions. Food insecurity, then, is a compounding challenge for students in addition to many other challenges they may

Table 3

Logistic Regressions of Food Insecurity on Academic Disruption for Students with Debt

	Model 1: Considered Dropping Out		Model 2: Reduced Course Load		Model 3: Neglected Academics	
	b (s.e.)	Odds Ratio	b (s.e.)	Odds Ratio	b (s.e.)	Odds Ratio
Food Insecure (ref. food secure)	1.251*** (0.262)	3.492	1.277*** (0.260)	3.584	1.230*** (0.243)	3.422
Female (ref. male)	-0.183 (0.255)	0.833	-0.453 (0.255)	0.636	-0.378 (0.241)	0.685
Race/Ethnicity (ref. White)						
African American	-0.089 (0.511)	0.915	-0.188 (0.521)	0.828	0.051 (0.496)	1.052
Asian or Asian American	0.611 (0.427)	1.842	0.534 (0.425)	1.705	0.537 (0.415)	1.710
Other race/multi-racial	0.301 (0.369)	1.352	0.150 (0.385)	1.162	0.327 (0.359)	1.367
Employment Status						
Full-time (ref. not employed full time)	0.680 (0.484)	1.975	1.927*** (0.497)	6.868	1.534** (0.486)	4.638
Part-time (ref. not employed part time)	0.075 (0.291)	1.078	0.798** (0.308)	2.221	1.256*** (0.294)	3.510
First generation student	0.217 (0.277)	1.242	0.098 (0.278)	1.103	0.028 (0.263)	1.029
Financially independent of parents/guardians	0.029 (0.297)	1.03	0.405 (0.285)	1.50	0.609* (0.276)	1.84
Financially responsible for other(s)	-0.116 (0.493)	0.891	-0.096 (0.498)	0.908	-0.479 (0.513)	0.619
Currently have debt from any source, including credit card debt, car loans, and personal loans (ref. no debt)						
Yes	0.564 (0.299)	1.758	0.228 (0.289)	1.256	0.726** (0.273)	2.066
Don't know	0.669 (0.560)	1.953	0.701 (0.547)	2.015	0.776 (0.533)	2.173
Traditionally aged college student (18–24)	-0.412 (0.435)	0.662	-0.282 (0.427)	0.322	0.175 (0.426)	1.191
Class Rank (ref. First-year)						
Second year	0.504 (0.398)	1.656	0.686 (0.428)	1.985	0.364 (0.385)	1.438

(continued)

Table 3

(Continued)

	Model 1: Considered Dropping Out		Model 2: Reduced Course Load		Model 3: Neglected Academics	
	b (s.e.)	Odds Ratio	b (s.e.)	Odds Ratio	b (s.e.)	Odds Ratio
Third year	0.009 (0.449)	1.009	0.512 (0.458)	1.669	-0.228 (0.425)	0.796
Fourth year or more	-0.195 (0.435)	0.823	0.187 (0.450)	1.205	-0.124 (0.411)	0.883
Residence (ref. on-campus)						
Off-campus, within walking distance	-0.118 (0.378)	0.889	-0.032 (0.388)	0.969	0.233 (0.355)	1.263
Off-campus, beyond walking distance	0.372 (0.390)	1.450	0.672 (0.396)	1.957	0.284 (0.374)	1.330
Constant	-2.057** (0.629)		-2.312*** (0.649)		-2.406*** (0.609)	
McFadden's R2	0.123		0.173		0.168	
Cragg and Uhler (Nagelkerke) R2	0.190		0.267		0.268	
BIC	-2059.727		-2059.830		-2017.529	
n	432		432		432	

Standard errors in parentheses.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

be facing. If students are not able to meet a basic need like procuring food, they may struggle in other areas of their life and school work.

Overall, this research confirms and expands what researchers and practitioners understand about food insecurity among college students. When compared to the existing research on food insecurity that focuses on other campuses, our estimation of food insecurity at one large public university campus is similar to these other studies. This study adds to the growing body of evidence that food insecurity on college campuses exists and impacts a significant portion of students. These results confirm, for example, other research that found that African American students had a higher likelihood of experiencing food insecurity (Dubick et al., 2016). Food insecurity's existence on campuses is often underestimated by faculty and staff in higher education (Crutchfield, 2016), so more research that brings this issue to the forefront can improve awareness of this issue. Additionally, it builds on the existing research by specifically looking at food insecurity among students with debt and students' responses to questions about disrupting their academic progress. In doing so, we begin to build a stronger case for the connection of food insecurity and academic success.

Future research should continue to draw connections between students' food insecurity experiences and their academic experiences, as well as consider the national generalizability of food insecurity studies. Future research should also continue to be directly applicable to practitioners helping students to confront food insecurity and should consider potential solutions for this issue.

Table 4

OLS Regression of Food Insecurity's Impact on GPA

	b (s.e.)
Grade Point Average	
Food Insecure (ref. food secure)	-0.174** (0.064)
Female (ref. male)	0.188** (0.059)
Race/Ethnicity (ref. White)	
African American	-0.036 (0.158)
Asian or Asian American	0.224* (0.104)
Other race/multi-racial	0.088 (0.089)
Employment Status (ref. not employed)	
Full-time	-0.193 (0.133)
Part-time	0.001 (0.066)
First generation student	-0.075 (0.069)
Financially independent of parents/guardians	-0.047 (0.075)
Financially responsible for other(s)	0.078 (0.149)
Currently have debt from any source, including credit card debt, car loans, and personal loans (ref. no debt)	
Yes	0.065 (0.065)
Don't know	-0.081 (0.138)
Traditionally aged college student (18–24)	-0.087 (0.114)
Class Rank (ref. first year)	
Second year	-0.300*** (0.089)
Third year	0.063 (0.104)
Fourth year or more	0.089

(continued)

Table 4

(Continued)

	b (s.e.)
	(0.098)
Residence (ref. on-campus)	
Off-campus, within walking distance	-0.072 (0.084)
Off-campus, outside of walking distance	-0.247** (0.091)
Constant	3.373*** (0.149)
R ²	0.177
Adjusted R ²	0.131
<i>n</i> = 340	

Standard errors in parentheses.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Finding a solution to food insecurity on college campuses is challenging, but colleges are stepping up to confront this issue in a variety of ways. Campuses are lobbying state governments to increase students' access to food stamps, helping eligible students to apply for food stamps, making food stamps a payment option in campus dining locations, starting on-campus food pantries, and much more (Goldrick-Rab, Broton, & Brunjes-Colo, 2016). Some researchers recommended establishing campus gardens to help address accessibility and availability of high quality nutrition for food insecure students (Chaparro et al., 2009). All of this work is important because college students often have limited transportation and may be unable to access local food pantries or other community food relief services. While many students experience food insecurity, they often do not qualify for emergency food assistance or government programs like food stamps, the Supplemental Nutrition Assistance Program (SNAP) (Goldrick-Rab et al., 2016).

Food assistance programs at the K-12 level, such as the NSLP and School Breakfast Program (SBP), provide low-cost or free breakfasts and lunches for students from families with incomes at or below 130% of the poverty line (Bickel, Nord, Price, Hamilton, & Cook, 2000). These national-level programs do not exist at the post-secondary level. Some scholars are beginning to argue for an expansion of the NSLP to higher education as a way to alleviate poverty among college students (Goldrick-Rab et al., 2016). Doing so would create a food security safety net for students as they continue their education, one that currently does not exist in part due to eligibility issues for the SNAP among post-secondary students.

Access to programs like SNAP is challenging or even impossible in some states if students do not have dependents and cannot "prove" their need (Goldrick-Rab et al., 2016). For post-secondary students to be eligible for SNAP benefits, they must work at least 20 hours a week, participate in the Federal Work Study Program, and/or have children (Lower-Basch & Lee, 2014; Goldrick-Rab et al., 2016). Many students cannot meet these eligibility requirements. Moreover, if students themselves are classified as their parents' dependents, they may not be able to access SNAP benefits at all. Colleges are beginning to understand these challenges and are working with

state governments when possible to make these programs more accessible to students (Goldrick-Rab et al., 2016).

For students who do participate in the SNAP program, colleges and universities are working to make SNAP benefits a payment option in campus dining locations. This can further improve students' food security on campus. Additionally, campus dining services can work with students on their campuses to understand what is and is not working for them to access food regularly, as well as helping students to understand the options in various food plans.

Many campuses are also establishing food pantries to confront student food insecurity on campus, often coordinated through student affairs offices. The College and University Food Bank Alliance (CUFBA), an association of campus food pantries across the country, encourages campus-based food banks and pantries to be a resource for students. As of November 10, 2017, the College and University Food Bank Alliance reported that 563 campus pantries were part of its network. Virtually all of this growth occurred within the last eight years; prior to 2008, only four campus food pantries existed (CUFBA, n.d.).

Nationally representative data have yet to be collected around student food insecurity and campus food pantry initiatives. Based on individual college and university reports, campus food pantries are viewed as a critical resource for undergraduate and graduate students. For example, at Michigan State University, about 200 to 300 students used the food bank every other week (Powers, 2012). Oregon State University served more than 300 students per month, including during school breaks (Cole, 2012). When North Carolina Central University opened its pantry, about 50 students used it in the first week without any advertisement (Schallhorn, 2014).

Data on campus food pantry users are also difficult to obtain because of the stigma associated with needing emergency food assistance. To address these concerns, Oregon State University recommended workshops on poverty and food security for pantry participants and an adoption of a confidentiality policy (Schallhorn, 2014). The limited interviews conducted with student pantry users suggested that even though the experience might be humbling initially, students are relieved to meet their food needs (Powers, 2012). Evidence from Michigan State University demonstrated that nutrition assistance was a vital resource for graduate students with families (Song, 2015).

As campuses become increasingly diverse and more students pursue higher education, food insecurity may become an even greater issue on campuses. Higher education administrators should consider student characteristics identified in our research as associated with food insecurity, such as first generation status, indebtedness, financial responsibility for others, and residence location when crafting initiatives to support students experiencing food insecurity. Future remedies may also include the development of academic and social support systems permeating throughout the campus and food relief network. Encouraging and training faculty and staff to look for indicators of food insecurity can help to create academic support solutions. Some colleges and universities are already beginning to link academic services to referral systems for food and housing insecurity resources, often through student affairs programs and offices. Programs like Single Stop USA help post-secondary students to access social service programs in partnership with their college's staff members (Daugherty, Johnston, & Tsai, 2016). College campuses are key access points for improving the food security of vulnerable students. Our study demonstrates that the need exists to design and implement targeted initiatives to improve the food security status of college students and to consider food insecurity's impact on academics.

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Appendix

Sample and Survey Demographics

Independent Variables	Sample Demographics (<i>n</i> = 508)	Survey Demographics (<i>n</i> = 666)	Institution Demographics ¹ <i>n</i> = 58,663 students
Gender			
Male	39.76%	40.33%	51.90%
Female	60.24%	59.67%	48.10%
Race/Ethnicity			
White	73.62%	73.88%	72.80%
African American or Black	5.51%	6.16%	6.00%
Asian or Asian American	9.25%	8.49%	5.40%
Other race/multi-racial	11.61%	11.48%	8.30%
Age			
Traditional (age 18–23)	88.78%	88.76%	89.10%
Non-traditional (age 24 or older)	11.22%	11.24%	8.70%
Years enrolled in post-secondary education			
1 year	19.88%	20.65%	21.20%
2 years	23.82%	24.72%	22.50%
3 years	23.03%	21.46%	21.90%
4 years or more	33.27%	33.17%	34.40%
First-generation status			
First generation student	29.13%	28.89%	24.6%
Non-first generation student	70.87%	70.00%	71.5%
Employment status			
Full-time	6.50%	7.21%	Not available
Part-time	59.65%	58.78%	
Not employed	33.86%	34.01%	
Currently have debt from any source, including credit card debt, car loans, and personal loans (ref. no debt)			
Currently has some form of debt	53.15%	53.97%	
Does not currently have any form of debt	41.34%	40.52%	
Don't know	5.51%	5.52%	
Percent of full-time, first-time degree-seeking students with federal student loans (from IPEDS 2014–2015) ²			42%
Percent of full-time, first-time degree-seeking students with other student loans (from IPEDS 2014–2015) ²			6%
Financially independent of parents/guardians			
Yes	26.97%	26.91%	
No	73.03%	73.09%	

(continued)

Appendix

(Continued)

	Sample Demographics	Survey Demographics	Institution Demographics ¹
Independent Variables	Sample (n = 508)	Sample (n = 666)	n = 58,663 students
Responsible for financial dependents			
Yes	4.72%	4.83%	Not available
No	95.28%	95.17%	
Residence			
On-campus	28.94%	29.61%	24.5% ³
Off-campus, within walking distance	44.29%	43.76%	74.5%
Off-campus, within driving distance	26.77%	26.63%	Combined w/above
Dependent Variables			
Food Insecure			
Yes	36.61%		
No	63.39%		
Consider dropping out due to money owed			
Yes (recoded from sometimes and frequently)	24.71%		
No	75.29%		
Reduced course load due to money owed			
Yes (recoded from sometimes and frequently)	28.11%		
No	71.89%		
Neglected academics due to money owed			
Yes (recoded from sometimes and frequently)	34.94%		
No	65.06%		

1. Institution percentages are only available at the aggregate level, meaning they include graduate and professional students in addition to undergraduate students.

2. Readers should be aware that these number from IPEDS only include full-time, first-time degree-seeking students, meaning that part-time and transfer students are not included. Our measure of debt includes ANY debt that students have (credit card debt, student loans, or personal loans). This does not map perfectly onto the IPEDS data.

3. The percentage of on-campus residence students is from residence life.