

## **Food Security and Part-Time Work for Students: Do Race and Region Play a Role?**

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# Food Security and Part-Time Work for Students: Do Race and Region Play a Role?

**Objective:** This study explored the relationship between weekly hours worked and food security among full-time college students in the United States, as well as the extent to which this relationship depends on racial identity and regional location. **Participants/Methods:** We performed a secondary analysis of data from 1,450 full-time college students in the labor force who completed the 2019 Food Security Supplement to the Current Population Survey. Moderated multiple logistic regression was used to analyze the data. **Results:** We found that among full-time college students in the labor force, working a greater number of hours per week was not related to one's likelihood of being food insecure, with an exception for students who identified as Asian. **Conclusions:** These findings highlight the importance of considering the intertwined nature of contributing factors to food security for specific groups of students.

Keywords: food security; college students; university; employment; secondary analysis; moderated multiple regression

## Introduction

Food security means “all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life”.<sup>1(p14)</sup> Though measurement techniques, response rates, and locations vary across studies, up to 60% of college students have reported some level of food insecurity, indicating this is a widespread issue on college campuses.<sup>2</sup> Food insecurity can impoverish students' mental and physical well-being and result in poor nutrition and disease, which in turn negatively impact college students' academic performance and increase one's likelihood of dropping out.<sup>3-6</sup> As food insecurity is a prevalent and complex phenomenon, we explored work, race, and regional location as factors predicting food insecurity among the college student population in the present study.

## **Literature Review**

### ***Theoretical Framework***

Alaimo's<sup>7</sup> conceptual model of food insecurity served as the theoretical framework for this study. Alaimo's model postulates a complex relationship between the determinants of food insecurity and individuals' attempts to reduce or prevent food insecurity through adjustment and adaptation. Within this framework, determinants of food insecurity—including demographic background, socioeconomic status, employment status, physical/mental well-being, environment, food literacy, and more—vary in their relative severity. Individuals and families can prevent or reduce their food insecurity by making both short-term adjustments (e.g., a temporary change to accommodate a recent shift in finances) or, in more severe cases, long-term adaptations (e.g., eliminating non-necessary life expenses).

When attempts to adjust or adapt are unsuccessful, food insecurity can negatively impact nutrition, physical well-being, psychological health (e.g., by causing shame, embarrassment, distress, anger due to hunger), and academic performance. Furthermore, Alaimo notes that food acceptability, the process through which an individual accepts the available resources for food acquisition, is just as important to food security as food availability. For example, the stigma associated with acquiring food from a food pantry or using food stamps may prevent individuals from pursuing these resources due to shame.

We approach this research with the understanding that food insecurity is a complex and essential phenomenon influenced by factors both beyond and within the control of individuals and their families. For this reason, we considered it appropriate to explore food security's relationship to both types of factors in the present study; e.g., college students in the labor force may not have control over all aspects of their

background and environment but may possess some control over their number of hours worked per week. Ultimately, an understanding of food insecurity remains incomplete without accounting for how food access and distribution intertwine with demographic, environmental, and financial factors alike.

### ***Food Insecurity on College Campuses***

Studies investigating the prevalence of food insecurity on college campuses often suffer from low response rates and vary widely in results.<sup>8,9</sup> Nevertheless, food insecurity seems widespread among full-time university students who respond when surveyed. For example, results from two studies conducted in 2009 and 2015 on samples of undergraduates from the state of Wisconsin found that 57% and 61% of respondents met some criteria for experiencing food insecurity.<sup>10</sup> Studies conducted at the University of Ohio, the University of Hawaii at Manoa, and Western Oregon University also found alarming rates of food insecurity among undergraduates, with 48%, 21%, and 59% of participants, respectively, meeting the criteria for food insecurity.<sup>8,11,12</sup> Despite inconsistencies regarding the percentage of students on four-year campuses who experience food insecurity, food insecurity remains a problem for many college students nationwide.

In the following subsections, we summarize our rationale for investigating the following three predictors of food insecurity among full-time college students in the labor force: (a) race; (b) region; and (c) employment.

### ***Food Insecurity and Race***

In the United States, “race and class play a central role in organizing the production, distribution, and consumption of food,”<sup>13(p4)</sup> where racially minoritized populations are regularly denied equal access to healthy and affordable sources of food, partly due to a

lack of accessible stores and markets within neighborhoods. Individuals belonging to racially minoritized groups are more likely than White Americans to be food insecure,<sup>14</sup> and this trend holds for college students.<sup>15–18</sup> Moreover, research has shown that food insecurity partially explains the association between being African American and obtaining a lower overall GPA,<sup>15</sup> which suggests racial disparities in food security may result in similar disparities in academic performance. These findings highlight the importance of understanding how food is distributed along racial lines within university student populations.

### ***Food Insecurity and Region of the United States***

Given documented differences in income by state and region in the United States,<sup>19</sup> it is possible that regional location also plays an essential role in determining access to food for college students. According to the United States Department of Agriculture's (USDA's) 2020 report on household food security in the United States, the Northeast region is significantly more food secure than the national average, while the Southern region is significantly less food secure than the national average.<sup>20</sup> Studies have similarly demonstrated that individuals residing in Southern regions of the United States may be more likely to have poor health and high levels of food insecurity.<sup>21,22</sup> Thus, it is likely that food security levels may be impacted by region of residence. However, to our knowledge, no study has investigated the relationship between regional location and food insecurity for college students.

### ***Food Insecurity and Employment***

Finally, research has linked food insecurity to employment status, where employed individuals are significantly more food secure than those who are unemployed.<sup>23</sup> However, the positive influence of employment on food security in the general

population may not hold for college students; in fact, research has shown that employment is related to *higher* levels of food insecurity within the college student population.<sup>12</sup>

In this regard, university life's high cost and time demands may create unique conditions that simultaneously exacerbate students' food insecurity and limit their earning potential. In other words, employment may have a unique relationship with food insecurity for college students because within the university context, employment serves more as an indicator of financial need rather than stability. For example, past research has found that college students from low-income families are more likely to work to offset expenses associated with attending school.<sup>24</sup> Thus, college students who choose to work may be more likely to be students who have less initial baseline access to food.

However, it is also possible that electing to work part-time during college may allow food insecure students to exercise control over their financial situation beyond taking out a loan. For example, students who work longer hours (e.g., at least an average 20 hours per week) may be eligible for the Supplemental Nutrition Assistance Program (SNAP). This federal program provides food-purchasing support for low-income individuals to reduce their food security risk.<sup>8,9</sup> Therefore, in this study, we explored how the number of hours a student works per week influences their food security status.

### ***Gaps in the Literature***

While past studies have demonstrated how race, region, and employment status may be significant food security predictors, several literature gaps remain. First, no study has evaluated all three factors together; as such, little knowledge exists of the relative effects of race, region, and employment status on food insecurity. Second, no study has

explored whether the relationship between employment and food insecurity depends on background characteristics such as race and region. Third, while racial disparities in food security among college students are relatively well-documented, little is known about how hours worked and region may impact food security for college students. Finally, many existing studies on college students in the United States are restricted to a single institution,<sup>6,8,17,25,26</sup> which limits the generalizability of their findings. Ultimately, more research that investigates the current state of food security in higher education nationwide is needed.

### **The Present Study**

In the present study, we sought to address the above gaps in the literature by answering the following research questions (RQs):

- (1) **RQ1:** Does the number of weekly hours worked predict food security for full-time college students in the labor force?
- (2) **RQ2:** Is the relationship between weekly hours worked and food security moderated by racial identity or region of residence?

### **Method**

#### ***Source Data Set and Data Collection Procedures***

This study is a secondary analysis of the Current Population Survey, December 2019 Food Security File public use data set. The Current Population Survey (CPS) is a tool that provides information on the economic status of the entire population of the United States over a given period. Households selected to participate in the CPS were chosen from approximately 1,987 designated geographic regions in the United States referred to as primary sampling units.<sup>27</sup> These regions were chosen to provide a nationally

representative sample of the United States. Approximately 56,000 of the eligible households participated in the 2019 survey. Individual participants responded on behalf of their entire household. Participants completed in-person interviews assessing income, employment, and other economic factors.

The Food Security Supplement (FSS), which we analyzed, is an additional questionnaire administered once annually as a supplement to the CPS. The FSS has been in use since 1995, and the USDA deemed it both reliable and internally valid in 1997.<sup>28</sup> In December 2019, the USDA administered the FSS to one adult per household participating in the CPS. Respondents were surveyed on their behaviors and experiences related to food security (including food security status, household food spending, and use of Federal nutrition assistance) over the past calendar year.<sup>20</sup>

### ***Participants***

Of the 138,964 individuals represented in the December 2019 CPS, 81,822 completed the FSS; nonresponse was due to households that were unwilling or unable to complete the Supplement.<sup>20</sup> The present study included the 1,450 participants who were reported to be full-time students at a college or university, as well as currently in the labor force (i.e., employed or unemployed). We restricted analysis to only include participants in the labor force because we considered it most meaningful to explore the relationship between weekly hours worked and food insecurity status for this subset of the college student population. Table 1 provides an unweighted participant breakdown of our sample.

### ***Measures***

Our outcome variable of interest was participants' Food Insecurity Status. Our independent variables of interest were participants' Weekly Hours Worked, Race, and



Region. We also controlled for participants' Age, Sex, and Birth Country as potential confounders in analysis. Measures are described in detail below, with variable names from the original data set provided in parentheses.

### *Food Insecurity Status*

Our outcome variable was Food Insecurity Status, a binary variable that classifies each participant's level of security (0 = food secure, 1 = food insecure). As part of the FSS, respondents completed the Adult Food Security Scale, 12-Month Reference Period, which assesses adult food security over the past year. Households were classified as having "high," "marginal," "low," or "very low" food security (HRSF12M8) based on the number of affirmative responses to 10 questions on the Adult Food Security Scale. Example items included: "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more" and "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Participants who answered "Often True" or "Sometimes True" to an item were considered to have given an affirmative response (in contrast to participants who answered "Never True" or "D[on't] K[now] or Refused").<sup>27</sup>

Participants were also screened prior to completing the Adult Food Security Scale by obtaining information on income level and participation in food assistance programs. Those who were assessed as being highly food secure were automatically assigned to the "high" food security category, instead of completing the entirety of the measure. Based on technical documentation recommendations accompanying the data set, we considered participants with "low" or "very low" food security to be food insecure, and participants with "marginal" or "high" food security to be food secure.<sup>27</sup>

### *Weekly Hours Worked*

Total weekly hours worked was selected as a continuous independent variable in

analysis. Each respondent was asked to report their weekly hours worked for pay at all jobs in the previous month (PEHRUSLT). If a respondent worked multiple jobs, the value provided represented total weekly hours worked across all jobs. Respondents could select “varies” instead of citing a specific number of weekly hours worked; 141 participants selected this option, and we considered these participants to be missing data on their average number of hours worked per week. Additionally, 52 respondents were not prompted to provide their number of hours worked per week because they identified as unemployed (see PEMLR in the original data set); we automatically assigned these participants a value of “0” for Weekly Hours Worked.

### *Demographic Background*

We included Race, Region, Age, Sex, and Birth Country as independent variables in analysis. CPS respondents were able to select from the following groups when asked to identify their race (PTDRACE): “White Only,” “Black Only,” “American Indian/Alaskan Native Only,” “Asian Only,” “Hawaiian/Pacific Islander Only,” or multiracial (where the participant would specify their race combination). Due to a small number of respondents belonging to certain racial categories, we recoded “American Indian/Alaskan Native,” “Hawaiian/Pacific Islander Only,” and all multiracial participants into a single category (“Other Race”) to preserve statistical power. Race was dummy coded into three variables (“Black,” “Asian,” “Other Race”), with “White” as the baseline group for comparison.

Respondents were required to identify their location of residence from one of four regions within the United States (GEREG): “Northeast,” “Midwest,” “South,” and “West”. Region was dummy coded into three variables (“Midwest,” “South,” “West”), with “Northeast” as the baseline group for comparison. Finally, we also controlled for participants’ age in years (PEAGE), sex (PESEX), and birth country (PENATVTY).

Age was treated as a continuous variable, and Sex and Birth Country were coded as binary variables, with “Male” and “United States” used as baseline groups for comparison, respectively.

### ***Data Analysis Procedures***

All data analyses were conducted using R version 4.0.3.<sup>29</sup>

#### *Missing Data*

Within our sample of respondents, 141 participants (9.72%) were missing information on Weekly Hours Worked, and 1 participant (0.07%) was missing information on Food Insecurity Status. No participants were missing information on any demographic variables. Given that untreated missing data can result in biased estimates and low statistical power,<sup>30</sup> we sought to estimate missing values using multiple imputation. However, modern approaches for handling missing data require that missing data be missing at random (MAR) or missing completely at random (MCAR). Thus, we performed Little’s Test of MCAR<sup>31</sup> on our data set, using the *naniar* package in R,<sup>32</sup> to test the assumption that missing values in our data were MCAR. Results of Little’s Test indicated a failure to reject the MCAR assumption,  $\chi^2(20) = 23.6, p = .26$ . Therefore, we considered multiple imputation to be an appropriate method for handling missing data in our sample. We performed multiple imputation using the *mice* package in R<sup>33</sup> to estimate missing values for Weekly Hours Worked (using predictive mean matching) and Food Insecurity Status (using logistic regression). We created and analyzed a total of 50 imputed data sets for the current study.

#### *Sampling Weights*

Based on technical documentation recommendations accompanying the data set,<sup>27</sup> the

person-level FSS weight (PWSUPWGT) was applied to all imputed versions of the data set prior to running analyses, using the *survey* package in R.<sup>34</sup> The person-level FSS weight adjusts for oversampling in the data set, to obtain results that correspond to a nationally representative sample of participants. To yield participant-level results, the weight variable was divided by 10,000 prior to conducting analyses.<sup>27</sup>

### *Logistic Regression*

We performed moderated multiple logistic regression on our imputed and weighted data sets using the *survey* package in R<sup>34</sup> to answer our two research questions. In the first step of our regression (Model 1), we regressed Food Insecurity Status on all predictors of interest to determine whether Weekly Hours Worked, Race, and Region predicted one's likelihood of being food insecure, holding Age, Sex, and Birth Country constant (thus addressing RQ1). In the second step of our regression (Model 2), we added interaction terms to our model to investigate whether the relationship between Weekly Hours Worked and Food Insecurity Status was moderated by Race or Region (thus addressing RQ2). In total, six interaction terms were created: Hours Worked\*Black, Hours Worked\*Asian, Hours Worked\*Other Race, Hours Worked\*Midwest, Hours Worked\*South, and Hours Worked\*West.

To avoid multicollinearity, we centered and standardized all continuous predictors using pooled mean values obtained via our multiple imputation procedure prior to creating our interaction terms and conducting regression analyses. Assessing the Variance Inflation Factor (VIF) for each predictor in the pooled version of the data set (using a cut-off of  $VIF > 6$ ),<sup>35</sup> we were able to determine there was no multicollinearity.

## Results

### *Descriptive Statistics*

Table 2 provides a weighted participant breakdown of our sample by race and region. Table 3 presents correlations between all variables in analysis, and Table 4 summarizes the average weekly hours worked for participants in each race and region, as well as food insecurity rates by race and region. Participants, on average, worked 25.14 hours per week ( $SD = 13.72$ ), and 8.52% of these students met the criteria for food insecurity, based on our weighted and pooled sample. Students belonging to the Black and Other Race groups were the most likely racial groups to be food insecure, with 12.89% of Black participants and 13.16% of Other Race participants meeting the standard for food insecurity. Students from the Southern region of the US were the most likely regional group to be food insecure, with 9.29% of participants residing in the region meeting the standard for food insecurity. Conversely, Asian students and students from the Northeast were the racial and regional groups with the lowest rates of food insecurity in our sample (1.91% and 6.22% food insecure, respectively).

### *Logistic Regression*

*RQ1: Does the number of weekly hours worked predict food security for full-time college students in the labor force?*

As a global test of Model 1, we performed a Wald Test for each imputed version of our data set using the *aod* package in R,<sup>36</sup> to determine whether our Model 1 predictors together explained a significant amount of variance of the logit of Food Insecurity Status. We obtained a pooled result for the global Wald Test by calculating the mean  $\chi^2$  test statistic across all 50 imputed versions of the data set. Results indicated that Model 1 predictors together (Weekly Hours Worked, Race, Region, Age, Sex, and Birth

Country) explained a significant portion of the variance of the logit of Food Insecurity Status,  $\chi^2(10) = 29.90, p = .001$ .

We report the pooled regression coefficients associated with Model 1 in Table 5. We found a non-significant association between Weekly Hours Worked and Food Insecurity Status for full-time college students, when controlling for Race, Region, Age, Sex, and Birth Country ( $p = .28$ ). In other words, number of hours worked per week did not predict one's likelihood of being food insecure, holding demographic background constant. Race significantly predicted one's likelihood of being food insecure, where Black students had 81% greater odds of being food insecure than White students ( $p = .047$ ), and Asian students had 72% less odds of being food insecure than White students ( $p = .049$ ), holding other predictors constant. Furthermore, Sex significantly predicted one's likelihood of being food insecure ( $p < .001$ ), where female students had 126% greater odds of being food insecure than male students. No other significant relationships were observed ( $p > .05$ ).

*RQ2: Is the relationship between weekly hours worked and food security moderated by racial identity or region of residence?*

We conducted a Wald test for each imputed version of our data set to determine whether the inclusion of interaction terms in Model 2 led to a significant increase in the amount of variance of the logit of Food Insecurity Status explained by our predictors. As was the case with Model 1, we obtained a pooled result by taking the mean  $\chi^2$  test statistic across all 50 data sets. Results indicated that the interaction terms together (Hours Worked\*Black, Hours Worked\*Asian, Hours Worked\*Other, Hours Worked\*Midwest, Hours Worked\*South, and Hours Worked\*West) explained a significant portion of the variance of the logit of Food Insecurity Status,  $\chi^2(6) = 13.70, p = .03$ . Thus, at least one of our included interaction terms significantly predicted one's likelihood of being food

insecure, holding other predictors constant.

We report the pooled regression coefficients associated with Model 2 in Table 6. We found a significant association between Hours Worked\*Asian and Food Insecurity Status for full-time college students, when controlling for Race, Region, Age, Sex, Birth Country, and other interaction terms ( $p = .04$ ). More specifically, among Asian participants, working a greater number of hours per work week was associated with a significantly greater likelihood of being food insecure, compared to White students. No other significant interactions between Weekly Hours Worked and Race were observed, and no significant interactions between Weekly Hours Worked and Region were observed ( $p > .05$ ). Thus, apart from the exception for Asian students, the relationship between Weekly Hours Worked and Food Security Status remained relatively stable across racial identity and region of residence within our sample.

## **Discussion**

### ***General Discussion***

In this study, we used the Current Population Survey, December 2019 Food Security data set to explore the relationship between weekly hours worked, race, region, and food insecurity status among full-time college students in the labor force. Data from the CPS suggests that the percentage of full-time college students in the labor force who are food insecure is generally lower than what has been reported in existing literature.<sup>8,10-12</sup> It is possible this disparity in findings is due to limitations in sampling procedures employed by past studies of food insecurity on college campuses; most past studies on this topic used surveys that were administered at a single institution, and many had low response rates. It is possible that students experiencing food insecurity were more likely to participate in these studies, which may have in turn resulted in higher observed rates

of food insecurity. In contrast, in the present study, the CPS data set reflected a random nationwide sample that likely did not over-select for students who were food insecure. Overall, it is encouraging that among full-time college students in the labor force, food insecurity does not appear to be as widely prevalent as past research would suggest.

We found that among full-time college students in the labor force, working a greater number of hours per week generally did not appear to be related to one's likelihood of being food insecure. We also found the relationship between weekly hours worked and food security was moderated by neither race nor region, with an exception for students who identify as Asian. We may have observed a general lack of an association between hours worked and food security because the relationship between these two constructs is not straightforward; some students may have obtained greater food security from working due to increased income, while others may have worked more hours due to an existing lack of reliable access to food. Moreover, it is possible that more important to food security than weekly hours worked may be a student's baseline financial resources or hourly wage. Future work should thus build on this study by exploring employment-related contributors to food security in more detail.

Furthermore, we found that Black students had significantly higher odds of being food insecure than White students, and Asian students had significantly lower odds of being food insecure than White students. These results align with previous research demonstrating that underrepresented minority students have higher overall rates of food insecurity.<sup>15,17,18</sup> Furthermore, we found a non-significant race by weekly hours worked interaction for Black vs. White students, which suggests that simply working a greater number of hours per week is not an effective strategy for reducing disparities in food insecurity between these two racial groups. Thus, our study lends support to the view that systemic racial biases in the United States prevent Black



college students from accessing the resources they need (e.g., financial security) to obtain adequate food security, relative to their White peers.<sup>37</sup>

Interestingly, we found that among students identifying as Asian, an increase in each weekly hour worked was associated with a greater likelihood of being food insecure, relative to White students. This finding suggests that Asian students, perhaps more so than other racial groups, were more likely to work out of necessity, as a means of improving their food security status. This result also indicates that having greater income due to work alone does not necessarily result in a greater likelihood of being food secure. However, given that only 1.91% of Asian students in our sample met the criteria for food insecurity (the lowest of any racial group), it is also possible that our small number of food insecure Asian participants resulted in unstable findings when conducting interaction analyses. Thus, future work should aim to further explore the connection between race, employment, and food security among a larger sample of college students.

We found no statistically significant differences in food insecurity status based on region of residence; thus, one's location in the United States may play a less salient role in determining food insecurity status than racial identity. However, although all regional differences in food security were non-significant, full-time students from the South displayed higher overall rates of food insecurity than students from other regions of the country; in this regard, our work complements previous research associating high food insecurity with the South.<sup>20-22</sup> Additionally, while the relationship between sex and food security was not the direct focus of this study, female students in our sample had significantly higher odds of identifying as food insecure than male students did, a finding that aligns with previous research examining how male and female students experience food security in the United States.<sup>38</sup>

In conclusion, this study contributes to existing literature on the relationship between employment and food security by examining weekly hours worked, a more nuanced measure of employment not addressed in previous studies. Our results show that, except for Asian students, working a greater number of hours per week was not significantly related to one's likelihood of being food insecure. Overall, our findings demonstrate that higher income alone due to employment may play a less important role in determining food insecurity status than demographic factors such as race and sex.

### ***Limitations***

This study has several limitations. First, the CPS data set was unable to provide a complete picture of why the observed relationships between employment, race, region, and food security exist, including missing information on why students chose to work, their fields of study, or their specific university setting. We also did not have data on the types of jobs students were involved in and how these jobs may have aligned with students' targeted careers of study. Second, although working a greater number of hours per week predicted greater food insecurity for Asian students only, it is unclear whether other socioeconomic factors contributed to higher levels of food insecurity for this particular group of students. For example, we were unable to determine whether students from specific racial groups or regions were more likely to receive financial aid, as well as whether such assistance included receipt of loans or scholarships. Finally, other background variables (such as parent educational attainment, living situation, and quality of prior educational preparation) that were not assessed in this study may also play a role in predicting a student's chances of being food insecure.

### ***Implications***

This study's findings have implications for theory, research, and practice. First, given

our finding that disparities in food security based on demographic background continue to persist on college campuses, this research emphasizes the continued relevance of Alaimo's<sup>7</sup> conceptual model of food security to the college context. Second, this work contributes to research by highlighting the pitfalls associated with investigating predictors of food security in isolation, as many past studies have done. For example, in this study, while it may initially have appeared that one's number of hours worked per week had no association with food insecurity status, this picture changed when accounting for the moderating effect of race for Asian students. Thus, future work should continue to consider the intertwined nature of contributing factors to food security for specific groups of students.

Our findings indicate that in practice, a greater number of hours worked alone is unlikely to predict most students' food security levels. However, further study of different types of employment, campus implementation of major-related employment, and/or paid experiences that guide minoritized students into higher paid careers upon graduation may shed light on beneficial employment opportunities for students who are likely to be food insecure. Finally, a greater understanding of relative rates of food insecurity by region may have implications for the distribution of federal aid to specific institutions. Distribution of this aid should be targeted to regions of the U.S. where full-time college students display higher initial levels of food insecurity. Nationally, the Department of Education might also consider targeted aid toward specific regions where food insecurity is prevalent among college students.

### ***Directions for Future Research***

Possibilities for future research include expansion to other minoritized populations and further exploration into the lives of students affected by food insecurity, as well as its academic and social consequences. For example, it may be beneficial to pilot and

examine the impact of targeted institution-level interventions designed to combat food insecurity in vulnerable populations. Because our research demonstrated that female students and Black students had higher rates of food insecurity than the general student population, these may be groups of interest for campus-level food security interventions. It may also be of interest to study how working Asian students experience food insecurity because the relationship between weekly hours worked and food insecurity looked different for students belonging to this racial group vs. others. Further study of the issues unique to food insecure Asian students may aid the development of strategies for improving the well-being of these students. Finally, there is room to expand this work to other variables impacting food security, including use of university meal plans, the type of university housing, type of employment (on-campus vs. off-campus), and types of financial aid provided by region.

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### **Data Availability Statement**

The data that supports the findings of this study are openly available in the United States Census Bureau Data Repository at: [https://www.census.gov/data/datasets/time-series/demo/cps/cps-supp\\_cps-repwgt/cps-food-security.html#cpssupps](https://www.census.gov/data/datasets/time-series/demo/cps/cps-supp_cps-repwgt/cps-food-security.html#cpssupps).

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## Tables

Table 1. Participant breakdown by race and region, unweighted.

<b>Variable</b>	<b>N</b>	<b>%</b>
<b>Race</b>		
<b>White</b>	1,134	78.21%
<b>Black</b>	157	10.83%
<b>Asian</b>	93	6.41%
<b>Other</b>	66	4.55%
<b>Region</b>		
<b>Northeast</b>	208	14.34%
<b>Midwest</b>	343	23.66%
<b>South</b>	468	32.28%
<b>West</b>	431	29.72%
<b>Total</b>	1,450	

Table 2. Participant breakdown by race and region, weighted.

<b>Variable</b>	<b>N</b>	<b>%</b>
<b>Race</b>		
<b>White</b>	4,756,577	70.50%
<b>Black</b>	1,072,554	15.90%
<b>Asian</b>	549,322	8.14%
<b>Other</b>	368,884	5.47%
<b>Region</b>		
<b>Northeast</b>	995,732	14.76%
<b>Midwest</b>	1,595,975	23.65%
<b>South</b>	2,473,814	36.66%
<b>West</b>	1,681,816	24.93%
<b>Total</b>	6,747,337	

Table 3. Pooled correlations for all variables in analysis.

Variable	1	2	3	4	5	6	7	8	9	10
<b>1. FIS</b>	—									
<b>2. WHW</b>	-.02	—								
<b>3. Black</b>	.07	.09	—							
<b>4. Asian</b>	-.07	-.03	—	—						
<b>5. Other</b>	.04	.01	—	—	—					
<b>6. Midwest</b>	.00	-.05	-.14	-.02	-.02	—				
<b>7. South</b>	.02	.11	.27	-.06	.00	—	—			
<b>8. West</b>	.00	.02	-.17	.09	.02	—	—	—		
<b>9. Age</b>	.04	.35	.15	.00	.04	-.08	.04	.04	—	
<b>10. Sex</b>	.11	-.01	.02	-.10	-.01	-.05	.08	-.08	.06	—
<b>11. Birth Country</b>	-.05	.04	.01	.45	-.06	-.09	.00	.06	.11	-.13

*Note.* Descriptive statistics are based on the weighted participant sample. “FIS” = Food Insecurity Status. “WHW” = Weekly Hours Worked.

Table 4. Participant hours worked and food security by race and region.

<b>Variable</b>	<b>Mean Weekly Hours Worked</b>	<b>% Food Insecure</b>
<b>Race</b>		
<b>White</b>	24.60	7.93%
<b>Black</b>	28.04	12.89%
<b>Asian</b>	23.82	1.91%
<b>Other</b>	25.68	13.16%
<b>Region</b>		
<b>Northeast</b>	21.84	6.22%
<b>Midwest</b>	23.81	8.54%
<b>South</b>	27.04	9.29%
<b>West</b>	25.57	8.71%
<b>Total</b>	25.14	8.52%

*Note.* Descriptive statistics are based on the weighted participant sample.

Table 5. Pooled coefficients from logistic regression – Model 1.

Variable	<i>b</i>	<i>SE</i>	Wald	<i>OR</i>	<i>OR 95% CI</i>
<b>(Constant)</b>	-3.41	0.38	-8.87**	0.03	[0.02, 0.07]
<b>Weekly Hours Worked</b>	-0.14	0.12	-1.09	0.87	[0.69, 1.11]
<b>Race (baseline = White)</b>					
<b>Black</b>	0.59	0.30	1.99*	1.81	[1.01, 3.23]
<b>Asian</b>	-1.28	0.65	-1.97*	0.28	[0.08, 0.99]
<b>Other</b>	0.58	0.46	1.26	1.78	[0.73, 4.38]
<b>Region (baseline = Northeast)</b>					
<b>Midwest</b>	0.51	0.39	1.32	1.66	[0.78, 3.54]
<b>South</b>	0.38	0.38	1.00	1.46	[0.69, 3.08]
<b>West</b>	0.59	0.39	1.53	1.80	[0.85, 3.84]
<b>Age</b>	0.12	0.11	1.09	1.12	[0.91, 1.38]
<b>Sex (baseline = Male)</b>	0.82	0.24	3.42**	2.26	[1.42, 3.60]
<b>Birth Country (baseline = US)</b>	-0.23	0.40	-0.59	0.79	[0.37, 1.72]

*Note.* Dependent variable: Food Insecurity Status. “WHW” = Weekly Hours Worked.

Continuous predictors (WHW, Age) were centered and standardized using pooled means prior to implementing analyses.

\* $p < .05$ . \*\* $p < .001$ .

Table 6. Pooled coefficients from logistic regression – Model 2.

Variable	<i>b</i>	<i>SE</i>	Wald	<i>OR</i>	<i>OR 95% CI</i>
<b>(Constant)</b>	-3.40	0.39	-8.73**	0.03	[0.02, 0.07]
<b>WHW</b>	-0.13	0.32	-0.41	0.88	[0.47, 1.64]
<b>Race (baseline = White)</b>					
<b>Black</b>	0.55	0.30	1.81	1.73	[0.96, 3.14]
<b>Asian</b>	-1.27	0.63	-2.00*	0.28	[0.08, 0.97]
<b>Other</b>	0.55	0.47	1.19	1.74	[0.70, 4.32]
<b>Region (baseline = Northeast)</b>					
<b>Midwest</b>	0.46	0.41	1.12	1.59	[0.71, 3.54]
<b>South</b>	0.37	0.39	0.95	1.45	[0.68, 3.11]
<b>West</b>	0.49	0.40	1.24	1.63	[0.75, 3.56]
<b>Age</b>	0.11	0.11	1.09	1.12	[0.91, 1.38]
<b>Sex (baseline = Male)</b>	0.82	0.24	3.47**	2.28	[1.43, 3.63]
<b>Birth Country (baseline = US)</b>	-0.18	0.41	-0.45	0.83	[0.37, 1.85]
<b>WHW*Race</b>					
<b>WHW*Black</b>	-0.01	0.29	-0.02	0.99	[0.57, 1.74]
<b>WHW*Asian</b>	0.75	0.37	2.06*	2.13	[1.04, 4.36]
<b>WHW*Other</b>	0.45	0.56	0.80	1.57	[0.52, 4.72]
<b>WHW*Region</b>					
<b>WHW*Midwest</b>	0.51	0.41	1.24	1.67	[0.74, 3.74]
<b>WHW*South</b>	-0.10	0.35	-0.28	0.91	[0.45, 1.82]
<b>WHW*West</b>	-0.41	0.36	-1.16	0.66	[0.33, 1.33]

*Note.* Dependent variable: Food Insecurity Status. “WHW” = Weekly Hours Worked.

Continuous predictors (WHW, Age) were centered and standardized using pooled means prior to implementing analyses.

\* $p < .05$ . \*\* $p < .001$ .