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Karen Camelo, Marta Elliott

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# Food Insecurity and Academic Achievement Among College Students at a Public University in the United States

Karen Camelo    Marta Elliott

*Using survey data collected from 3,245 university students, we examined correlates of frequency of food insecurity and of grade point average (GPA), the association between food insecurity and GPA, and whether food insecurity mediates the associations between student characteristics and GPA. The results indicated that Black, Hispanic, Pell Grant-eligible, and first-generation college students were relatively frequently food insecure and that students who were more often food insecure, Black, Hispanic, or eligible for Pell Grants, tended to have lower GPAs. Moreover, indirect pathways from student characteristics to GPA via food insecurity partially mediated associations between student characteristics and GPA. These indirect pathways suggest that a portion of the association between being Black and lower GPA, for example, may be accounted for by relatively greater frequency of food insecurity among Black students. Policy implications are presented to suggest how universities, in collaboration with local and federal programs, might reduce food insecurity on campus.*

The purpose of this study was to estimate correlates of food insecurity among college students at a public university in the Western United States and to assess the association between food insecurity and academic achievement. In addition, this study gauged the extent to which food insecurity accounted for the associations between students' academic performance, their racial/ethnic identity, and

their socioeconomic status (i.e., income and parents' educational background).

Food insecurity, or lack of consistent access to affordable, nutritious, and adequate food (U.S. Department of Agriculture [USDA], Coleman-Jensen, Gregory, & Rabbitt, 2017), is a serious public health problem (Pereira & Hodge, 2015) affecting 12.7% of US households (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2016). Households that are headed by single parents or Black or Hispanic people and households with children or with income at or below the federal poverty line in the US have rates of food insecurity that are higher than the national average (Coleman-Jensen et al., 2016).

College students are often overlooked in national-level studies in which data on food insecurity at the household level are collected (Coleman-Jensen et al., 2016), yet they are at heightened risk relative to the general population (Broton, Frank, & Goldrick-Rab, 2014). Estimates of the rates of food insecurity vary considerably between college campuses, from 14.0% (Gaines, Robb, Knol, & Sickler, 2014) to 21.0% (Chaparro, Zaghoul, Holck, & Dobbs, 2009) to 59.0% (Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014). Studies in which data across multiple campuses have been compiled suggest that food insecurity among college students ranges from 43.5% (Nazmi et al., 2018) to 48.0% (Dubick, Matthews, & Cady, 2016) to over half of all students (Broton & Goldrick-Rab, 2018).

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*Karen Camelo is a graduate of the University of Nevada, Reno. Marta Elliott is Professor of Sociology at the University of Nevada, Reno. Contributors to the design and implementation of this study include Sandra Rodriguez, Amy Koeckes, and Jennifer Lowman.*

The high risk of food insecurity among college students exists alongside the rising cost of attending college and the changing composition of the college student population in the US. Attending college is increasingly unaffordable for most students owing to rising tuition and the declining availability of need-based federal aid (Dynarski & Scott-Clayton, 2013; Goldrick-Rab, 2016). At the same time, the proportion of high school graduates enrolling in college is also rising (Baum, Ma, & Payea, 2013), as is the proportion of all college students who are from historically underrepresented racial/ethnic minority groups or from low-income families (Baum, Kurose, & McPherson, 2013; Gault, Reichlin, & Román, 2013).

College students from disadvantaged racial/ethnic minority groups or families with relatively low socioeconomic status are at elevated risk of food insecurity. Students who identify as Black or Hispanic are more likely to be food insecure than their White student counterparts (Dubick et al., 2016; Freudenberg et al., 2011; Goldrick-Rab, Broton, & Eisenberg, 2015; Goldrick-Rab, Richardson, Schneider, Hernandez, & Cady, 2018; Maroto, Snelling, & Linck, 2015; Payne-Sturges, Tjaden, Caldeira, Vincent, & Arria, 2018). First-generation college students are more likely to be food insecure than students whose parent(s) attended college (Dubick et al., 2016; Goldrick-Rab et al., 2015; Goldrick-Rab et al., 2018), and students who qualify for the Pell Grant are also more likely to be food insecure than those who do not (Dubick et al., 2016; Goldrick-Rab et al., 2018; Goldrick-Rab, Richardson, & Hernandez, 2017). The Pell Grant is the largest federal need-based grant program for undergraduate students in the US ("Federal Pell Grant Program," 2010); as such, Pell Grant recipients tend to be from low-income families (Wei & Horn, 2002).

College students who are most at risk of food insecurity are also at higher risk of poor

academic performance. Black and Hispanic students tend to have lower grade point averages (GPAs; Woo, Green, & Matthews, 2012) than their White student counterparts. First-generation college students also tend to have lower GPAs (X. Chen, 2005; Holmes & Slate, 2017) than students whose parent(s) attended college. Students who receive the Pell Grant tend to have lower GPAs than those who do not ("Federal Pell Grant," 2018).

Recent research reveals that food insecurity is associated with poor academic performance among college students. College students who are food insecure report that being worried or tired (Glik & Martinez, 2017) and having difficulty concentrating (Henry, 2017; Martinez, Webb, Frongillo, & Ritchie, 2018) interferes with their schoolwork. Compared to students who are food secure, food-insecure students are more likely to fail or withdraw from class (Silva et al., 2015), and they tend to have lower GPAs (Maroto et al., 2015; Morris, Smith, Davis, & Null, 2016; Patton-López et al., 2014).

Food insecurity may hinder academic performance among college students by forcing them to work for pay to afford food and other basic necessities (Broton & Goldrick-Rab, 2018). Demanding work schedules may drive down grades by interfering with class attendance, completion of coursework, and getting adequate sleep (Farrington et al., 2012). In addition, the impact over time of the stress of economic insecurity may cause cognitive deficiency and memory problems (Lupien & McEwen, 1997; Lupien et al., 1998) by increasing cortisol levels in the brain (Lupien, King, Meaney, & McEwen, 2000).

Differences in risk of food insecurity and in average levels of academic achievement according to race/ethnicity and socioeconomic status exist long before students enter college (Biddle, 2014; Coleman-Jensen, McFall, & Nord, 2013). Children are more likely to be

food insecure if they reside in households headed by Black or Hispanic versus White adults, adults who are not employed or only working part time versus full time, and adults who have not finished high school versus have a high school degree or more education (Coleman-Jensen et al., 2013). Students classified as Black or Hispanic had lower standardized test scores than White students in reading, math, and science in the 4th, 8th, and 12th grades (McFarland et al., 2017). Children entering kindergarten in 2010 whose parents did not graduate from high school or whose income was below the federal poverty line had lower reading, math, and science scores for 4 years in a row compared to their counterparts whose parents were better off (McFarland et al., 2017).

The achievement gap (Haycock, 2001) between groups in average test scores has been attributed to factors in the home including low parent involvement, especially in single-parent households and those in which parents work long hours to make ends meet (Baron & Coley, 2009). It may also reflect the cumulative academic effects of food insecurity, which is associated with lower math scores among children ages 5 to 11 (Alaimo, Olson, & Frongillo, 2001; Winicki & Jemison, 2003) and academic declines in reading and math between kindergarten and third grade (Jyoti, Frongillo, & Jones, 2005).

Disparities in academic achievement have also been attributed to school factors, namely unequal access to a quality public school education, or to the opportunity to learn, (i.e., an opportunity gap; Carter & Welner, 2013; Cowan Pitre, 2014; da Silva, Huguley, Kakli, & Rao, 2007; Schmidt & McKnight, 2012). Students who do not have equal access to a quality K–12 education tend to perform worse in college (Mo, Singh, & Chang, 2013; Schmidt & McKnight, 2012; Sirin, 2005).

The opportunity gap is tied to where students reside, which dictates where most

of them go to public school. Residential racial segregation (Darling-Hammon, 2010) and the geographic concentration of poverty (Orfield & Lee, 2005) are linked to the quality of a public school education. Schools in neighborhoods with high concentrations of poor or disadvantaged racial/ethnic minority households tend to have relatively poor-quality teaching, outdated curriculum materials such as textbooks, minimal technology, and crumbling infrastructure (Barton, 2004; Darling-Hammond, 2010; Kozol, 1991/2012). The minority of students who graduate from these school systems and defy the odds by enrolling in college may have already accumulated a lifetime of deprivations, putting them at risk of academic failure and food insecurity in college (Baron & Coley, 2009).

Previous research has revealed that college students who identify as Black or Hispanic or whose parents are low-income or relatively uneducated are more likely to be food insecure and tend to have lower grades than students who are White. These patterns may reflect cumulative disadvantages these students have faced from lifetime exposure to food insecurity and unequal access to the opportunity to learn in the public K–12 school system. The purpose of this study was to examine the correlates of food insecurity at a public university in the Western US and to test if food insecurity mediates the associations between student race/ethnicity, socioeconomic status, and GPA. The results may guide postsecondary educational policies designed to ensure academic success for all students.

## METHOD

### Participants

Data were collected from students at a public, midsize land grant university in the Western US; according to the Carnegie Classification, it is a doctoral university: higher research

activity. Admissions requirements include a 3.0 GPA for incoming students and 2.5 for transfer students. All undergraduate students who made their contact information available to the public (16,310 of 16,562 or 98.5% of students at the university) were contacted on May 1, 2016, and received three reminders over the course of 3 weeks to participate in a survey. The survey was exempt from review by the Institutional Research Integrity Board, because it was deemed to pose minimal risk to human subjects. Of the 16,310 students, 3,590 responded to the survey. The sample analyzed in this study ( $N = 3,245$ ) included all students who provided data on food insecurity and who were classified as Asian, Black, Hispanic, or White.

Students' racial/ethnic identities were based on information they provided in their university application, which included two questions. The first asked students if they were "Hispanic or Latino." The next asked them to "check the racial category (or categories) with which you most closely identify" from 5 options: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or White. Students who identified as Hispanic or Latino were categorized as Hispanic regardless of what other categories they chose. All other students who selected more than one identity were categorized as multiracial.

Data were not available on the specific categories chosen by the 207 students classified as multiracial, rendering the meaning of multiracial ambiguous. Preliminary analyses found no associations between reporting multiple identities other than Hispanic and any of the other variables in the analyses, so this subset was omitted from the final analyses. Students who identified as Native American or Alaska Native ( $n = 25$ ), Native Hawaiian or Other Pacific Islander ( $n = 27$ ), who did not report their race/ethnicity ( $n = 36$ ), or

who were foreign students ( $n = 36$ ) were also omitted owing to small sample sizes.

The study sample ( $N = 3,245$ ) was compared to 13,065 students who either did not meet the inclusion criteria or were survey nonrespondents with an independent samples  $t$  test mean comparison for variables available for all students from institutional data. Results indicated that the study sample included a higher percentage of female students (66.0% vs. 49.0%), Asian students (8.5% vs. 6.8%), Hispanic students (22.2% vs. 17.9%), White students (65.8% vs. 59.0%), and students eligible for the Pell Grant (41.0% vs. 36.0%) than the comparison group. In addition, students in the study sample tended to be enrolled in more units (14.25 vs. 13.49) and to have higher GPAs (3.13 vs. 2.86), but they were no different from the remaining students in terms of age, year in college, or being a Black student.

## Measures

Food insecurity was assessed with a modified version of the USDA 6-item U.S. Household Food Security Survey Module (Woo, Green, & Matthews, 2012) in which household-level items were reworded to be applicable to college students. Students were asked how true each of the following statements were, from 1 (*never true*) to 4 (*often true*): (a) The food I buy each month does not last and I do not have money to buy more, (b) I can't afford to eat balanced meals, (c) I skip meals because I don't have enough food, (d) I eat less than I want to because there is not enough money for food, and (e) I am often hungry because I don't have money for food. Overall food insecurity was measured by the mean value across these 5 items, and the alpha reliability of this scale was .93. Index scores reflect frequency of exposure to food insecurity. Food insecurity was also gauged by estimating the percentage of students who selected *sometimes true* or



*often true* for all 5 items; this result was 23%, however, the continuous measure was favored for the multivariate analyses.

The original scale (USDA, 2012) evaluates three categories of food *security* based on the same 5 phenomena with items that are worded quite similarly; however, the original uses 3 rather than 4 frequency response options for items 1 and 2, and *yes/no* response options for items 3 through 5. In addition, a sixth item follows the *yes/no* question regarding skipping or cutting the size of meals with 3 options for frequency.

Several measures were merged with the survey data via students' identification numbers from the university's institutional database. Academic achievement was assessed by the GPA that students achieved at the end of the semester in which the survey data were collected (Spring 2016). Gender was coded as 1 (female) and 0 (male), based on the category students selected on their university applications. (There were no other options). Mutually exclusive racial/ethnic categories described above included White, Black, Hispanic, and Asian. Age was measured in years to control for differences in traditional versus nontraditional age students. Pell Grant eligibility (1, yes vs. 0, no) indicated that the student qualified for the means-tested grant based on financial criteria determined by the federal government; this was included as a proxy for low income. Year in college was coded from 1 (first year) to 5 (seeking second degree) and was included to control for the expected positive association between persistence in college and academic achievement (Brown et al., 2008). Number of credits enrolled in, ranging from 1 to 24, was included to control for the expected positive association between taking a challenging academic load and doing well in college.

The remaining student characteristics were assessed in the survey. Students were classified as first-generation if they reported that their parents had achieved less than a 2-year

associate's degree (e.g., high school diploma or technical certificate). Hours worked per week was measured on a scale where 0 = *not working*, 1 = *1–9 hours per week*, 2 = *10–19*, 3 = *20–29*, 4 = *30–39*, 5 = *40–49*, and 6 = *50 or more*. It was included as an indicator of financial need and of allocated time competing with academic requirements. Living on campus (1) versus off campus (0) was included because students who live on campus tend to have healthier diets (Small, Bailey-Davis, Morgan, & Maggs, 2013), to be more socially integrated (Schudde, 2011), and to be more likely to persist in college (Mamiseishvili, 2010) than those who live off campus.

## Statistical Analyses

The data were analyzed with Mplus (version 7.4) as a structural equation model (SEM) in which food insecurity was treated as a mediator of the associations between student characteristics and GPA. As such, food insecurity was regressed on student characteristics, and GPA was regressed on food insecurity and student characteristics. The model was estimated with a full information maximum likelihood estimator yielding standard errors robust to heteroscedasticity (Hayes & Cai, 2007). The full model was identified with 0 degrees of freedom. In order to estimate fit statistics, two nonsignificant predictors of food insecurity were removed from the model: being female and number of credits the student was enrolled in. Criteria used to assess the overall model fit of the SEM included values greater than .95 for CFI, values below .08 for RMSEA and SRMR (Hu & Bentler, 1999), and a nonsignificant chi-square value (Hooper, Coughlan, & Mullen, 2008).

Standardized indirect pathways from student characteristics to GPA via food insecurity were then calculated in Mplus. An indirect effect was determined to be

significant via two criteria: if bootstrapped 95% confidence intervals based on 10,000 bootstrap samples did not contain 0, and if an indirect effect was deemed statistically significant according to the Delta method (Bollen, 1989).

## RESULTS

Mean food insecurity was 2.14 ( $SD = .95$ ) on a scale from 1 (*never*) to 4 (*often*) and mean GPA was 3.13 ( $SD = .80$ ). Of the sample, 66.0% identified as female, 65.8% as White, 3.4% as Black, 22.2% as Hispanic, and 8.5% as Asian. The mean age was 22.06 years ( $SD = 5.34$ ), and 38.7% of the sample was eligible for the Pell Grant. The mean year in college was 2.7 ( $SD = 1.1$ ), corresponding closely to junior year. Of the sample, 12.0% lived on campus and 28.0% were first-generation college students. The average number of hours worked per week was 1.39 ( $SD = 1.65$ ), and the average number of academic credits enrolled in was 14.25 ( $SD = 3.29$ ).

Several variables were correlated with frequency of food insecurity: being White was negatively associated with food insecurity ( $r = -.10, p < .01$ ), whereas being Black ( $r = .06, p < .01$ ) and being Hispanic ( $r = .09, p < .01$ ) were positively associated with it. Age was negatively associated with food insecurity ( $r = -.08, p < .01$ ) while Pell Grant eligibility was positively associated with it ( $r = .12, p < .01$ ). Students further along in school were less often food insecure ( $r = -.07, p < .01$ ), as were students who lived on campus ( $r = -.04, p < .05$ ). In contrast, first-generation college students ( $r = .10, p < .01$ ) and students who worked relatively more hours per week ( $r = .07, p < .01$ ) were more often food insecure. When food insecurity was treated as categorical (i.e., the 23.0% of students who selected *sometimes* or *often* on all 5 items), mean differences indicated the same patterns (e.g., Black and Hispanic students were more likely to be food

insecure) with the exception of year in college, which was unrelated to the dummy variable.

Food insecurity was negatively associated with GPA ( $r = -.18, p < .01$ ), whereas being female ( $r = .14, p < .01$ ) and White ( $r = .10, p < .01$ ) were positively associated with it. Being Black ( $r = -.08, p < .01$ ), being Hispanic ( $r = -.08, p < .01$ ), and Pell Grant eligibility ( $r = -.06, p < .01$ ) were negatively associated with GPA, while year in college ( $r = .11, p < .01$ ), living on campus ( $r = .07, p < .01$ ), and number of credits enrolled in ( $r = .13, p < .01$ ) were positively associated with it.

The hypothesized structural equation model fit the data well (RMSEA = .008, CFI = .999, SRMR = .003,  $\chi^2 = 2.50, df = 2, p < .29$ ). All else being equal, being Black ( $b = .27, SE = .09, p < .01$ ) or Hispanic ( $b = .13, SE = .04, p < .01$ ) versus White, Pell Grant eligibility ( $b = .19, SE = .04, p < .001$ ), being a first-generation college student ( $b = .11, SE = .04, p < .01$ ), and working relatively more hours per week ( $b = .05, SE = .01, p < .001$ ) were each positively associated with frequency of food insecurity. In contrast, being older ( $b = -.02, SE = .004, p < .001$ ), further along in college ( $b = -.01, SE = .002, p < .001$ ), and living on campus ( $b = -.21, SE = .05, p < .001$ ) were negatively associated with frequency of food insecurity.

Net of the other student characteristics in the model, frequency of food insecurity was negatively associated with GPA ( $b = -.13, SE = .01, p < .001$ ). Being female ( $b = .23, SE = .03, p < .001$ ), being further along in college ( $b = .01, SE = .001, p < .001$ ), living on campus ( $b = .23, SE = .04, p < .001$ ), and number of credits enrolled in ( $b = .04, SE = .01, p < .001$ ) were positively associated with higher GPA. Lastly, being Black ( $b = -.32, SE = .08, p < .001$ ), being Hispanic ( $b = -.12, SE = .04, p < .001$ ), and Pell Grant eligibility ( $b = -.07, SE = .03, p < .05$ ) were negatively associated with GPA.

## Indirect Pathways

Several indirect pathways between student characteristics and GPA via food insecurity were statistically significant, suggesting that food insecurity partially mediates associations between, for example, student race/ethnicity and GPA. Specifically, there was an indirect association between being Black and GPA ( $b = -.03$ ,  $SE = .01$ ,  $p < .01$ ) and being Hispanic and GPA ( $b = -.02$ ,  $SE = .01$ ,  $p < .01$ ) via food insecurity. Similarly, there was an indirect association between Pell Grant eligibility and GPA ( $b = -.03$ ,  $SE = .01$ ,  $p < .001$ ) and being a first-generation college student and GPA ( $b = -.01$ ,  $SE = .01$ ,  $p < .05$ ) via food insecurity. In terms of the relative size of indirect versus direct pathways, the indirect pathway for Black students was 9.6% of the total effect, whereas for Hispanic students it was 11.7%, and for students with Pell Grant eligibility it was 26.9%. Lastly, the indirect pathway for first-generation college students explained 63.6% of the total effect (the direct effect was small and nonsignificant). This percentage was calculated by dividing the indirect effect by the sum of the absolute values of the indirect and direct effects (MacKinnon, Fairchild, & Fritz, 2007).

## DISCUSSION

Among college students in the US, food insecurity is a serious problem that can interfere with their academic performance; moreover, it disproportionately affects Students of Color, first-generation college students, and students of limited financial means who may already be at an academic disadvantage owing to lifetime exposure to food insecurity and unequal opportunities to learn in the K–12 public school system. This study addresses differences in frequency of food insecurity according to students' self-reported racial/ethnic identities and socioeconomic status

indicators of parents' educational background and family income. It also presents an estimate of the association between food insecurity and student GPA. Lastly, it demonstrates the extent to which food insecurity mediates the associations between students' race/ethnicity, their socioeconomic status, and their GPA.

This study shows that college students who are Black, Hispanic, first-generation, and have Pell Grant eligibility tend to be food insecure more often than their more advantaged counterparts, patterns that are reported consistently throughout the literature on food insecurity among college students (Dubick et al., 2016; Freudenberg et al., 2011; Goldrick-Rab et al., 2015, 2017, 2018; Maroto et al., 2015; Payne-Sturges et al., 2018). For example, Goldrick-Rab et al. (2018) analyzed data from 43,000 students at 66 institutions of higher education across 20 states in the US; they documented a relatively high risk of food insecurity among students who were Black, Hispanic, first-generation, and recipients of the Pell Grant.

The results also indicate that college students who are Black, Hispanic, first-generation, and have Pell Grant eligibility have relatively low grades, consistent with U.S. Department of Education data (Woo et al., 2012) and other studies (X. Chen, 2005; Holmes & Slate, 2017). Lastly, the results are consistent with research that has documented a negative association between food insecurity and GPA among college students (Maroto et al., 2015; Morris et al., 2016; Patton-López et al., 2014).

In addition to supporting previous research on food insecurity and academic achievement, this study reveals links between student racial/ethnic and socioeconomic characteristics, food insecurity, and GPA in a simple mediation model. It shows that food insecurity partially mediates the association between student characteristics and GPA for students who are Black, Hispanic, first-generation, and have Pell Grant eligibility.



When students enter college, they bring histories of unequal opportunities to learn (Schmidt & McKnight, 2012) and uneven access to adequate nutrition (Coleman-Jensen et al., 2013), both of which contribute to the achievement gap (i.e., group differences in standardized test scores; McFarland et al., 2017). The results of this study suggest, but cannot confirm, that food insecurity interferes with academic performance among college students and thereby may perpetuate the achievement gap. As such, postsecondary institutions are in a position to narrow the opportunity gap by ensuring a healthy diet for all students.

### Policy Implications

The U.S. Department of Education (2013) has acknowledged and committed to change unequal access to quality K–12 public education by reducing financial inequities between school districts, supporting adequate preparation and salaries for teachers, and providing necessary resources such as curriculum materials and technology. Institutions of higher education may follow suit and address the particular needs of vulnerable college students by ensuring equal access to sufficient amounts of healthy food.

Food insecurity is not an individual problem alone: it reflects the availability of resources in the local community (W. Chen, Clayton, & Palmer, 2015). With the prevalence of food insecurity on college campuses (Brotan & Goldrick-Rab, 2018), solutions should not only target individuals, they should address insufficiencies in the college environment that allow for inadequate nutrition among students.

The first step is to identify students in need and assess the scope of the problem. Information about food insecurity should be included on college applications and monitored throughout students' tenure at universities to ensure their needs are met. Students with food

insecurity could also be identified via financial aid applications (FAFSA). Those who meet the criteria for means-based financial aid are likely to be at risk of food insecurity and could be directed to sign up for federal benefits such as SNAP ("Supplemental Nutrition Assistance Program," 2017) before they begin college (Dubick et al., 2016).

A food pantry that provides free food to students in need is one of the most common interventions on college campuses according to the College and University Food Bank Alliance (<http://www.cufba.org>). These pantries can be stocked with leftover food from campus cafeterias and on-campus food vendors (<http://www.foodrecoverynetwork.org>) as well as food paid for by the university. With easy apps, such as one created by the Share Meals Organization (<http://sharemeals.org>), students on meal plans can donate unused meals.

However, not all students with food insecurity are aware of on-campus resources, and some are deterred from using them because of perceived stigma (Henry, 2017; Saul, 2016). Universities could get the word out at new student orientations and make sure resources for students with food insecurity are easily located on university websites. Information should also be available in centers that serve students, such as student health, counseling, and disability resource centers, and professionals who run these centers should be on the lookout for students who are food insecure.

There are also ways to assist students who are food insecure without triggering a sense of inadequacy for being in need. Single-stop offices where students can go to access all resources on campus, including food, could reduce stigma by not singling out students who are food insecure (Freudenberg et al., 2011; Goldrick-Rab, Brotan, & Brunjes Colo, 2016). Student ID cards could be programmed according to financial need and used like cash for students who qualify to receive free or

reduced-price food on campus without visibly identifying those individuals.

Perceived stigma toward students who are financially insecure could also be reduced via consciousness-raising events and movements on campus organized by student clubs or integrated into service-learning projects. Raising awareness, in turn, could lead to educating all students that social inequality is not merely an abstract concept: it is a reality that disadvantages students who may sit next to them in class, in part owing to inadequate nutrition.

Universities are situated within broader communities and should collaborate with existing programs, such as grassroots food movements and local government programs. Mobile food markets (“Food Markets on Wheels,” 2016) are popping up across the US, typically consisting of buses that stop in locales where food insecurity is prevalent; colleges and universities could be added to these routes. Community food banks could put universities on lists of where people can donate food or organize food drives.

Federal and local governments could also assist college campuses in addressing food insecurity via programs such as SNAP, a federal entitlement program that provides debit cards that can be used to purchase food at participating businesses (USDA, 2017b). Bringing SNAP representatives to campus could simplify the application process for students, and all food establishments on college campuses should accept SNAP debit cards as payment. Moreover, the SNAP requirement to work 20 or more hours per week could be waived for full-time college students.

The federal government could also expand the National Free Lunch Program and other school food programs organized through the USDA (“Food Distribution,” 2018) to include publicly funded colleges and universities (Goldrick-Rab et al., 2016), thereby

guaranteeing students have at least one nutritious meal per day. Universities could also apply to the National Institute of Food and Agriculture for competitive grants that fund community food projects (“Community Food Projects,” 2016).

In sum, there are numerous steps that postsecondary administrators could take to ensure food security for all students. On campus, they could guarantee to make available to students in need healthy food that would otherwise be disposed of and to make on-campus food affordable for them. In addition they could work with local food movements and government agencies as well as the federal government to reduce hunger and eliminate food insecurity for all students.

## LIMITATIONS AND FUTURE RESEARCH

Despite their critical policy implications for higher education, the results of this study must be interpreted within the confines of the study’s limitations. The data were collected from a sample of students at 1 public university and may not reflect its entire student body, let alone students at similar postsecondary institutions. Only 1 of 5 students who were invited to take the survey completed it. In addition, the data are cross-sectional and correlational and therefore ill-equipped to demonstrate causal relationships. They do not capture students’ life experiences prior to attending college, including their home environments and the quality of their K–12 education, both of which are likely related to academic performance and food insecurity in college. In addition, the data are limited to students who identified as Asian, Black, Hispanic, or White, so the results may not apply to students who identify with other groups, such as Native American / Alaska Native, or to students who report multiple ethnic identities. Lastly, food insecurity is measured in this study on a continuum of how often a student

experiences it, unlike most studies that treat the phenomenon as categorical.

Further research on academic achievement and food insecurity should track students from early childhood into their college years, assessing both home and school factors. Students from underrepresented racial/ethnic minority groups should be oversampled, and detailed information on ethnicity should be retained from students who identify with more than one racial/ethnic group. Standard USDA measures of food insecurity should be included along with measures that capture the cyclical nature of the phenomenon.

## CONCLUSION

Food insecurity is not only a public health

problem, it is a barrier to academic achievement among college students in the US. Successful completion of a college education increases the chances that individuals will secure paid employment that provides for their basic needs and leads to upward mobility. Leaders in postsecondary institutions should explore programs and policies to identify, reduce, and potentially eliminate food insecurity among college students. In so doing, they might reduce the achievement gap in educational attainment and bring up grades and graduation rates for all students.

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*Correspondence concerning this article should be addressed to Marta Elliott, 1664 N. Virginia Street, Mail Stop 300, University of Nevada, Reno, NV 89557; melliott@unr.edu*

## REFERENCES

- Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*, 108, 44-53.
- Baron, P. E., & Coley, R. J., (2009). *Parsing the achievement gap II* [Policy Education Report]. Princeton, NJ: Educational Testing Service. Retrieved from <http://www.ets.org/Media/Research/pdf/PICPARSINGII.pdf>
- Barton, P. E. (2004). Why does the gap persist? *Educational Leadership*, 62(3), 8-13.
- Baum, S., Kurose, C., & McPherson, M. (2013). An overview of American higher education. *The Future of Children*, 23(1), 17-39. doi:10.1353/foc.2013.0008
- Baum, S., Ma, J., & Payea, K. (2013). *Education pays 2013: The benefits of higher education for individuals and society*. New York, NY: The College Board. Retrieved from <http://www.rilin.state.ri.us/Special/ses15/commdocs/Education%20Pays,%20The%20College%20Board.pdf>
- Biddle, B. (2014). *Social class, poverty and education*. New York, NY: Routledge.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York, NY: Wiley.
- Broton, K. M., Frank, V., & Goldrick-Rab, S. (2014). *Safety, security, and college attainment: An investigation of undergraduates' basic needs and institutional response*. Paper presented at the annual meeting of the Association for Public Policy and Management, Albuquerque, NM. Retrieved from <http://www.wihopelab.com/publications/APPAM.Draft.10.28.2014.pdf>
- Broton, K. M., & Goldrick-Rab, S. (2018). Going without: An exploration of food and housing insecurity among undergraduates. *Educational Researcher*, 47, 121-133. doi:10.3102/0013189X17741303
- Brown, S. D., Tramayne, S., Hoxha, D., Telander, K., Fan, X., & Lent, R. W. (2008). Social cognitive predictors of college students' academic performance and persistence: A meta-analytic path analysis. *Journal of Vocational Behavior*, 72, 298-308. doi:10.1016/j.jvb.2007.09.003
- Carter, P. L., & Welner, K. G. (Eds.). (2013). *Closing the opportunity gap: What America must do to give every child an even chance*. New York, NY: Oxford University Press.
- Chaparro, M. P., Zaghoul, S. S., Holck, P., & Dobbs, J. (2009). Food insecurity prevalence among college students at the University of Hawai'i at Mānoa. *Public Health Nutrition*, 12, 2097-2103. doi:10.1017/S1368980009990735
- Chen, W., Clayton, M. L., & Palmer A. (2015). *Community food security in the United States: A survey of the scientific literature* (Vol. 2). Baltimore, MD: John Hopkins Center for a Livable Future. Retrieved from [http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/\\_pdf/research/clf\\_reports/CFS-Lit-Review-II-final.pdf](http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/_pdf/research/clf_reports/CFS-Lit-Review-II-final.pdf)
- Chen, X. (2005). *First-generation students in postsecondary education: A look at their college transcripts* (NCES 2005-171). Washington, DC: National Center for Education Statistics, United States Department of Education. Retrieved from <http://nces.ed.gov/pubs2005/2005171.pdf>
- Coleman-Jensen, A., Gregory, C. A., & Rabbitt, M. P. (2017). *Definitions of food security*. Retrieved from <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>
- Coleman-Jensen, A., McFall, W., & Nord, M. (2013). *Food insecurity in households with children: Prevalence, severity, and household characteristics, 2010-11* (No. 262126). Washington, DC: United States Department of Agriculture, Economic Research Service.

- Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2016, September). *Household food security in the United States in 2015* (No. ERR-215). Washington, DC: Economic Research Service, United States Department of Agriculture. Retrieved from <http://www.ers.usda.gov/publications/pub-details/?pubid=79760>
- Community food projects help fight food insecurity. (2016, April 7). Retrieved from <http://nifa.usda.gov/announcement/community-food-projects-help-fight-food-insecurity>
- Cowan Pitre, C., (2014). Improving African American student outcomes: Understanding educational achievement and strategies to close opportunity gaps. *Western Journal of Black Studies*, 38, 209-217.
- da Silva, C. D., Huguley, J. P., Kakli, Z., & Rao, R. (2007). *The opportunity gap: Achievement and inequality in education*. Harvard Educational Review Reprint Series. Cambridge, MA: Harvard Education Press.
- Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future*. New York, NY: Teachers College Press.
- Dubick, J., Matthews, B., & Cady, C. (2016, October). *Hunger on campus: The challenge of food insecurity for college students* [Report]. A project of College and University Food Bank Alliance et al. Retrieved from [http://studentsagainsthunger.org/wp-content/uploads/2016/10/Hunger\\_On\\_Campus.pdf](http://studentsagainsthunger.org/wp-content/uploads/2016/10/Hunger_On_Campus.pdf)
- Dynarski, S., & Scott-Clayton, J. (2013). *Financial aid policy: Lessons from research* (NBER Working Paper No. 18710). Retrieved from the National Bureau of Economic Research website <http://www.nber.org/papers/w18710>
- Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance: A critical literature review*. Chicago, IL: University of Chicago Consortium on Chicago School Research. Retrieved from <http://consortium.uchicago.edu/sites/default/files/publications/Noncognitive%20Report.pdf>
- Federal Pell Grant program: Eligibility. (2010). Retrieved from <http://www2.ed.gov/programs/fpg/eligibility.html>
- Food distribution: USDA foods in schools. (2018). Retrieved from <http://www.fns.usda.gov/fdd/schoolscn-usda-foods-programs>
- Food markets on wheels brings nutritious, affordable food option to food insecure areas. (2016, May 25). Retrieved from <http://nifa.usda.gov/announcement/food-markets-wheels-bring-nutritious-affordable-food-options-food-insecure-areas>
- Freudenberg, N., Manzo, L., Jones, H., Kwan, A., Tsui, E., & Gagnon, M. (2011, April). *Food insecurity at CUNY: Results from a survey of CUNY undergraduate students*. New York, NY: Healthy CUNY Initiative, City University of New York. Retrieved from [http://www.gc.cuny.edu/CUNY\\_GC/media/CUNY-Graduate-Center/PDF/Centers/Center%20for%20Human%20Environments/cunyfoodinsecurity.pdf](http://www.gc.cuny.edu/CUNY_GC/media/CUNY-Graduate-Center/PDF/Centers/Center%20for%20Human%20Environments/cunyfoodinsecurity.pdf)
- Gaines, A., Robb, C. A., Knol, L. L., & Sickler, S. (2014). Examining the role of financial factors, resources and skills in predicting food security status among college students. *International Journal of Consumer Studies*, 38, 374-384. doi:10.1111/ijcs.12110
- Gault, B., Reichlin, L., & Román, S. (2013). *College affordability for low-income adults: Improving returns on investment for families and society*. Washington, DC: Institute for Women's Policy Research. Retrieved from <http://files.eric.ed.gov/fulltext/ED556725.pdf>
- Glik, D., & Martinez, S. (2017). College students identify university support for basic needs and life skills as key ingredient in addressing food insecurity on campus. *California Agriculture*, 71, 130-138.
- Goldrick-Rab, S. (2016). *Paying the price: College costs, financial aid, and the betrayal of the American dream*. Chicago, IL: University of Chicago Press.
- Goldrick-Rab, S., Broton, K., & Brunjes Colo, E. (2016, May 16). *Why the time is right to expand the National School Lunch Program to higher education*. Retrieved from <http://www.scholarsstrategynetwork.org/brief/why-time-right-expand-national-school-lunch-program-higher-education>
- Goldrick-Rab, S., Broton, K., & Eisenberg, D. (2015, December). *Hungry to learn: Addressing food & housing insecurity among undergraduates*. Madison: Wisconsin HOPE Lab, Wisconsin Center for Education Research, University of Wisconsin. Retrieved from [http://hope4college.com/wp-content/uploads/2018/09/Wisconsin\\_HOPE\\_Lab\\_Hungry\\_To\\_Learn.pdf](http://hope4college.com/wp-content/uploads/2018/09/Wisconsin_HOPE_Lab_Hungry_To_Learn.pdf)
- Goldrick-Rab, S., Richardson, J., & Hernandez, A. (2017, March). *Hungry and homeless in college: Results from a national study of basic needs insecurity in higher education*. Madison: Wisconsin HOPE Lab, Wisconsin Center for Education Research, University of Wisconsin. Retrieved from: <http://hope4college.com/wp-content/uploads/2018/09/Hungry-and-Homeless-in-College-Report.pdf>
- Goldrick-Rab, S., Richardson, J., Schneider, J., Hernandez, A., & Cady, C. (2018, April). *Still hungry and homeless in college*. Madison: Wisconsin HOPE Lab, Wisconsin Center for Education Research, University of Wisconsin. Retrieved from <http://hope4college.com/wp-content/uploads/2018/09/Wisconsin-HOPE-Lab-Still-Hungry-and-Homeless.pdf>
- Haycock, K. (2001). Closing the achievement gap. *Educational Leadership*, 58(6), 6-11.
- Hayes, A. F., & Cai, L. (2007). Using heteroscedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, 39, 709-722.
- Henry, L. (2017). Understanding food insecurity among college students: Experience, motivation, and local solutions. *Annals of Anthropological Practice*, 41, 6-19. doi:10.1111/napa.12108
- Holmes, D. L., & Slate, J. R. (2017). Differences in GPA by gender and ethnicity/race as a function of first-generation status for community college students. *Global Journal of Human-Social Science Research*, 17(3), 1-5.
- Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modeling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6, 53-60.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55. doi:10.1080/10705519909540118
- Jyoti, D. F., Frongillo, E. A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal of Nutrition*, 135, 2831-2839. doi:10.1093/jn/135.12.2831
- Kozol, J. (2012). *Savage inequalities: Children in America's schools*. New York, NY: Crown. (Original work published 1991)



- Lupien, S. J., de Leon, M., de Santi, S., Convit, A., Tarshish, C., Nair, N. P. V., . . . & Meaney, M. J. (1998). Cortisol levels during human aging predict hippocampal atrophy and memory deficits. *Nature Neuroscience*, 1, 69-73. doi:10.1038/271
- Lupien, S. J., King, S., Meaney, M. J., & McEwen, B. S. (2000). Child's stress hormone levels correlate with mother's socioeconomic status and depressive state. *Biological Psychiatry*, 48, 976-980.
- Lupien, S. J., & McEwen, B. S. (1997). The acute effects of corticosteroids on cognition: Integration of animal and human model studies. *Brain Research Reviews*, 24, 1-27. doi:10.1016/S0165-0173(97)00004-0
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, 58, 593-614. doi:10.1146/annurev.psych.58.110405.085542
- Mamiseishvili, K. (2010). Effects of employment on persistence of low-income, first-generation college students. *College Student Affairs Journal*, 29(1), 65-93.
- Maroto, M. E., Snelling, A., & Linck, H. (2015). Food insecurity among community college students: Prevalence and association with grade point average. *Community College Journal of Research and Practice*, 39, 515-526. doi:10.1080/10668926.2013.850758
- Martinez, S. M., Webb, K., Frongillo, E. A., & Ritchie, L. D. (2018). Food insecurity in California's public university system: What are the risk factors? *Journal of Hunger & Environmental Nutrition*, 13, 1-18. doi:10.1080/19320248.2017.1374901
- McFarland, J., Hussar, B., de Brey, C., Snyder, T., Wang, X., Wilkinson-Flicker, S., . . . & Hinz, S. (2017). *The condition of education 2017* (NCES 2017-144). Washington, DC: National Center for Education Statistics, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubs2017/2017144.pdf>
- Mo, Y., Singh, K., & Chang, M. (2013). Opportunity to learn and student engagement: A HLM study on eighth grade science achievement. *Educational Research for Policy and Practice*, 12, 3-19.
- Morris, L. M., Smith, S., Davis, J., & Null, D. B. (2016). The prevalence of food security and insecurity among Illinois university students. *Journal of Nutrition Education and Behavior*, 48, 376-382. doi:10.1016/j.jneb.2016.03.013
- Nazmi, A., Martinez, S., Byrd, A., Robinson, D., Bianco, S., Maguire, J., . . . Ritchie, L. (2018). A systematic review of food insecurity among US students in higher education. *Journal of Hunger & Environmental Nutrition*. Advance online publication. doi:10.1080/19320248.2018.1484316
- Orfield, G., & Lee, C. (2005). *Why segregation matters: Poverty and educational inequality*. Cambridge, MA: Civil Rights Project, Harvard University. Retrieved from <http://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/why-segregation-matters-poverty-and-educational-inequality/orfield-why-segregation-matters-2005.pdf>
- Patton-López, M. M., López-Cevallos, D. F., Cancel-Tirado, D. I., & Vazquez, L. (2014). Prevalence and correlates of food insecurity among students attending a midsize rural university in Oregon. *Journal of Nutrition Education and Behavior*, 46, 209-214. doi:10.1016/j.jneb.2013.10.007
- Payne-Sturges, D. C., Tjaden, A., Caldeira, K. M., Vincent, K. B., & Arria, A. M. (2018). Student hunger on campus: Food insecurity among college students and implications for academic institutions. *American Journal of Health Promotion*, 32, 349-354. doi:10.1177/0890117117719620
- Pereira, R. A., & Hodge, A. (2015). Food insecurity: A critical public health nutrition concern. *Public Health Nutrition*, 18, 2893-2894. doi:10.1017/S136898001500292X
- Saul, S. (2016, June 22). Food pantries address a growing hunger problem at colleges. *The New York Times*. Retrieved from <http://www.nytimes.com/2016/06/23/education/food-pantries-address-a-growing-hunger-problem-at-colleges.html>
- Schmidt, W. H., & McKnight, C. C. (2012). *Inequality for all: The challenge of unequal opportunity in American schools*. New York, NY: Teachers College Press.
- Schudde, L. T. (2011). The causal effect of campus residency on college student retention. *Review of Higher Education*, 34, 581-610.
- Silva, M. R., Kleinert, W. L., Sheppard, A. V., Cantrell, K. A., Freeman-Coppadge, D. J., Tsoy, E., & Pearrow, M. (2015). The relationship between food security, housing stability, and school performance among college students in an urban university. *Journal of College Student Retention: Research, Theory & Practice*, 19, 284-299. doi:10.1177/1521025115621918
- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75, 417-453. doi:10.3102/00346543075003417
- Small, M., Bailey-Davis, L., Morgan, N., & Maggs, J. (2013). Changes in eating and physical activity behaviors across seven semesters of college: Living on or off campus matters. *Health Education & Behavior*, 40, 435-441.
- Supplemental Nutrition Assistance Program (SNAP). (2017). Retrieved from <http://www.fns.usda.gov/snap/eligibility>
- U.S. Department of Agriculture. (2012, September). *U.S. household food insecurity survey module: Six-item short form*. Washington, DC: Economic Research Service, Author. Retrieved from <http://www.ers.usda.gov/media/8282/short2012.pdf>
- U.S. Department of Education. (2013). *For each and every child: A strategy for education equity and excellence*. Washington, DC: Author. Retrieved from <http://www2.ed.gov/about/bdscomm/list/eec/equity-excellence-commission-report.pdf>
- Wei, C. C., & Horn, L. (2002, May). *Persistence and attainment of beginning students with Pell Grants* (NCES 2002-169). Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubs2002/2002169.pdf>
- Winicki, J., & Jemison, K. (2003). Food insecurity and hunger in the kindergarten classroom: Its effect on learning and growth. *Contemporary Economic Policy*, 21, 145-157. doi:10.1093/cep/byg001
- Woo, J., Green, C., & Matthews, M. (2012, October). *Web tables: Profile of 2007-08 first-time bachelor's degree recipients in 2009* (NCES 2013-150). Washington, DC: National Center for Education Statistics, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubs2013/2013150.pdf>