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The role of university students' wellness in links between homelessness, food insecurity, and academic success

Mary E. Haskett [a], Suman Majumder [b], Dana Kotter- Grühn[a] and Indira Gutierrez[a]*

[a]Department of Psychology, North Carolina State University, Raleigh, NC, USA; [b]Department of Statistics, North Carolina State University, Raleigh, NC, USA

ABSTRACT

In recent years there has been a steep increase in attention among higher education professionals to the prevalence of unmet basic needs among college students. There is also growing acknowledgement that food insecurity and homelessness among students is associated with incredible distress and a host of negative consequences for students' success. Understanding the mechanisms that link basic needs insecurity to academic success could identify critical points of intervention to ensure educational equity among students. Our aim was to determine whether university students' wellness mediated the association between unmet basic needs (i.e. homelessness and food insecurity) and academic success. Of the 1,330 students at a large southeastern U.S. university who completed an online survey (28% response rate), 15.49% were food insecure and 9.47% had been homeless in the past 12 months. Results of multinomial logistic regression analyses indicated that psychological well-being and sleep mediated the link between food security and GPA. Homelessness was not associated with GPA, so mediation was not examined. Implications for addressing homelessness and food insecurity among college students are offered.

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It has long been assumed that students enrolled in college are somewhat elite, economically privileged individuals unlikely to face challenges associated with poverty, such as hunger, housing instability, and homelessness (see Goldrick-Rab, 2016). That assumption has been challenged in the past few decades as wages and financial aid have not kept pace with the rapidly rising cost of higher education and the demographic characteristics of U.S. college students have shifted to include more students from economically disadvantaged families (Goldrick-Rab, 2016). In recent years there has been increased attention to food insecurity and homelessness among college students, and studies indicate very high prevalence rates. To illustrate, findings from the largest investigation of four-year U.S. colleges conducted to date indicated that 36% of university students reported being food insecure in the prior 30 days (Goldrick-Rab, Richardson, Schneider, Hernandez, & Cady, 2018). Variation in rates of food insecurity across the 35 universities was wide, with estimates ranging from approximately 15% to 60%. The study also showed that 9% (range of 5%–15% across sites) of the students had been homeless in the prior 12 months.

Many students who face hunger and/or lack stable housing report that those experiences negatively impact their education in a variety of ways. They are significantly less likely than students whose basic needs are met to attend and perform well in class, and they are at greater risk for slow matriculation and not completing their degrees due to failing or withdrawing from classes (Gallegos, Ramsey, & Ong, 2014; Silva et al., 2017). There is also evidence that food and housing insecurity are associated with lower academic achievement (Payne-Sturges, Tjaden, Caldeira, Vincent, & Arria, 2018) and lower grade point average (Maroto, Snelling, & Linck, 2015; Martinez, Webb, Frongillo, & Ritchie, 2018; Morris, Smith, Davis, & Null, 2016; Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014).

Food insecurity and homelessness among college students should be viewed through an educational equity lens. To inform responsible solutions to the challenge of student basic needs insecurity and ensure greater equity, the next phase in this line of research must include investigations of mechanisms that account for the links between food and housing insecurity and low academic success. That is, the association between basic needs insecurity and academic functioning is fairly well-established (Maroto et al., 2015; Silva et al., 2017), but investigators have not examined whether homelessness and hunger might affect academics indirectly, through other intervening variables. One potential mechanism is student wellness. Understanding the possible mediating role of wellness could have implications for development of approaches to support vulnerable college students

CONTACT Mary E. Haskett mehasket@ncsu.edu Department of Psychology, Campus Box 6750, Raleigh, NC 27695, USA
*Indira Gutierrez is now a graduate student at the University of South Carolina.

who are food insecure or without housing. Such was the purpose of this investigation.

Research indicates that there is a clear link between food insecurity and emotional well-being in the general population (Bruening, Dinour, & Chavez, 2017) and a strong association between poor mental health functioning and homelessness among adolescents and young adults (Armstrong, Owens, & Haskett, 2016; Tucker, Edelen, Ellickson, & Klein, 2011). There is also evidence that college students who experience food and housing insecurity report indicators of low wellness such as feeling down or tired, having a poor appetite, and feeling bad about oneself (Payne-Sturges et al., 2018). Although there is less research on implications of basic needs insecurity for sleep problems, evidence from the general literature on food insecurity/hunger and homelessness links these challenges to sleep disturbances. For example, Liu, Njai, Greenlund, Chapman, and Croft (2014) found that insufficient sleep and frequent mental distress were more common among adults who reported food insecurity or housing insecurity than among those who were food and housing secure. Frequent mental distress did not mediate the association between food and housing insecurity and insufficient sleep. We conceptualized wellness broadly, including psychological well-being and quantity of sleep. These indicators of wellness are highly correlated in the general population (Strine & Chapman, 2005) and in samples of college students (Milojevich, Lukowski, & Chao, 2016), but were examined separately in our analyses.

To date, there have been no investigations of the degree to which wellness might serve as a mechanism in the association between basic needs insecurity and college students' academic performance. We sought to fill this gap in the literature. Given prior research findings, we hypothesized that there would be significant relations among the predictors (food insecurity, homelessness), mediators (psychological well-being, sleep), and outcome (grade point average, GPA). We further hypothesized that wellness would mediate the link between homelessness and GPA. In other words, we expected that homelessness would predict higher psychological distress which, in turn, would be associated with poor academic performance among college students.

Method

Participants and Procedure

Our university research office used standard tools to identify a random sample of 7,000 students selected to be representative of the student population in terms of race, gender, and degree-seeking status (undergraduate/graduate). Students who were enrolled exclusively in online courses were excluded from the random selection process; this was the single exclusionary criteria. A total of 1,949 of the 7,000 students consented to participate in the study but 26 students did not respond to any survey questions and there was missing data for one or more study variables for some students, so the total sample for this study was 1,330. Those students were representative of the student body in race (3.9% African American; 4.7% Bi- or Multi-racial; 12.5% Asian; 75% White; 3.9% other) and degree sought (1.0% Associates degree, 72.9% undergraduate degree, 26.0% graduate degree). Six percent of the sample was of Hispanic origin. The sample slightly over-represented female students (55.7%) compared to the university population (45.6%). Mean age was 21.87 ($SD = 4.3$), with a range of 18–54 years. Most participants (94.8%) were enrolled full time.

An email invitation to complete the online survey was sent to the 7,000 potential participants. If students wanted to participate, they clicked the link, which sent them to a full explanation of the study and informed consent information. At the end of the survey, students could enter a drawing for a gift card by providing their email address. Students who responded within one week were entered in the drawing for $100; those who responded by the second week were entered in the drawing for $75; those who responded by the third week were entered for $50. The survey was open for 4 weeks. Weekly reminders were sent to those who had not yet completed the survey. Procedures were approved by the university IRB.

Measure

Our survey items were borrowed from Crutchfield and MaGuire (2017) and the HOPE Lab (Goldrick-Rab, Richardson, & Kinsley, 2017), with some adjustments for our specific research questions. Completion of the full survey required approximately 16 minutes.

Food security

The USDA's Household/Individual Food Security Survey Module (FSSM) 10-item version was used, with a 30-day timeframe. Two of the 10 questions asked participants to report the number of days certain food situations occurred in the past 30 days. Formatting of this part of the survey might have been confusing because almost no participant who should have answered those two questions actually provided an answer. Therefore, we adjusted the coding using a conservative approach to defining Very Low Food Security (definitions for the other three categories remained the same). Participants were classified into one of four categories: those who provided affirmative responses to none (0) of the FSSM items were considered Food Secure, participants with scores of 1–2 were considered Marginally Food Secure, and those with scores of 3–5 were considered Low Food Secure. Participants with

scores of 6–8 were considered Very Low Food Secure (compared to scores of 6–10 in the 10-item coding). Consistent with other studies, we generated a "Food Insecure" variable by combining students who were Low Food Secure or Very Low Food Secure. The food insecurity variable was coded as missing for participants who did not complete all eight items, unless their sum score was above 6 despite the missing values. With a score of 6 or higher, participants would have been placed into the same food security category had they responded to all items.

Homelessness

Homelessness was defined based on nine questions about housing status that equated to homelessness by U.S. Department of Education criteria in the McKinney Vento Act (U.S. Dept of Education, 2016). If students indicated they had slept in any one of nine conditions (e.g. at a shelter, couch surfing, outdoor location, hotel or motel without a permanent home to return to) in the past 12 months, they were classified as having experienced homelessness.

Well-being

The World Health Organization Five Factor Well-Being Index (WHO–5; Johansen, 1998) includes five items that describe states of well-being (e.g. "I have felt cheerful and in good spirits"). Participants rated each statement on a 6-point scale based on how often each state was experienced (from "All of the time" to "At no time") in the past two weeks. Mean scores ranged from 1–6 with higher scores indicating greater well-being. Psychometric properties are strong (Topp, Østergaard, Søndergaard, & Bech, 2015) and the tool has been validated as a screener for college students (Downs, Boucher, Campbell, & Polyakov, 2017). Specifically, scores of college participants correlated highly with validated criterion measures of depression and anxiety. Internal consistency for our sample was acceptable (Cronbach's alpha = .88).

Sleep

A single question was used to measure students' typical nightly sleep. Participants were asked, "On an average school night, how many hours of sleep do you get?" They selected from one of seven options, ranging from "4 hours or less" to "10 hours or more." We re-categorized the responses into two groups: "Less than 7 hours" and "7 hours or more" based on evidence-based consensus on adequate sleep (Watson et al., 2015).

Table 1. Coefficients, their standard deviation, and significance for the multinomial logistic regression model of food security on GPA.

GPA category	Variable	Coefficient	Std. Error	Significance
"3.5–4.0"	Intercept	1.924	0.297	<0.001
	Food Secure	1.668	0.381	<0.001
	Food Insecure	0	–	–
"3.0–3.4"	Intercept	1.766	0.300	<0.001
	Food Secure	1.222	0.385	0.002
	Food Insecure	0	–	–
"2.5–2.9"	Intercept	0.767	0.336	0.022
	Food Secure	0.907	0.423	0.032
	Food Insecure	0	–	–

GPA

Participants were asked to indicate which of six categories best described their current grade point average. The categories were "3.5–4.0," "3.0–3.4," "2.5–2.9," "2.0–2.4," "1.5–1.9" and "1.0–1.4." Of the 1330 responses, only one participant was in the category "1.0–1.4," one in "1.5–1.9" and 29 in "2.0–2.4"; thus, we combined those participants into a single category labeled "1.0–2.4"

Results

Preliminary descriptive analyses indicated that 15.49% of student participants met the criteria for food insecurity and 9.47% had experienced at least one form of homelessness. The most common forms of homelessness were couch surfing (4.6%), staying in an outdoor location such as alley or bus stop (2.6%) or in a camper (1.8%). To test for mediation by wellness, four separate multinomial logistic regression analyses were performed with GPA as the criterion variable, well-being and sleep as the mediators (tested separately) and food security status or homelessness as the predictor variables (tested separately). The reference category for all analyses was GPA "1.0–2.4." Baron and Kenny's (1986) recommended steps for mediation were followed.

Well-being as a Mediator to Food Insecurity

The multinomial logistic regression model with GPA as criterion and food security as predictor was significant, χ^2 (3) = 25.431, $p < 0.001$, Nagelkerke pseudo R^2 = 0.022. The coefficients for each of the classes were significant at the 5% level (see Table 1). The baseline group were students with a GPA below 2.5. Within each GPA category, food insecure was the baseline group. For each category, the intercept term was the log odds for a student with food insecurity to be in that GPA category as opposed to the baseline GPA category (below 2.5). The intercept term 1.924 for the GPA category 3.5–4.0 means that the odds of a food insecure student having a GPA in the 3.5–4.0 range was $e^{1.924} = 6.848$. That means, a food insecure student was 6.848 times more likely to have a GPA in the 3.5–4.0 range than a GPA below 2.5. For each GPA category, the coefficient for the variable "Food Secure" was the additional effect food security had to the said log odds ratio. For instance, a positive coefficient of 1.668 in the GPA category 3.5–4.0 means that, for a

food secure student, the odds of having a GPA in the 3.5–4.0 range was $e^{(1.924 + 1.668)} = e^{3.592} = 36.307$. In other words, the food secure student was 36.307 times more likely to have a GPA in the 3.5–4.0 range than a GPA below 2.5.

Next we used a binomial logistic regression to ascertain the linear relation between the predictor food security and the mediator well-being. This was also a significant model with χ^2 (1) = 44.9, $p < 0.001$, Nagelkerke pseudo-$R^2 = 0.057$. Finally, the model for mediation was found to be significantly better than the model without mediation, χ^2 (3) = 9.148, $p = 0.027$. The final model had Nagelkerke pseudo-$R^2 = 0.030$. The estimated coefficients for food security were lower in magnitude compared to the non-mediated model (see Table 2). The baseline GPA category was GPA below 2.5, as in Table 1. The intercept for each GPA category was the log odds ratio for a food insecure student with zero well-being score to be in a given GPA range as opposed to having a GPA below 2.5. For each GPA category, the coefficient for "Food Secure" was the additional effect to the said log odds ratio for a food secure student for a given well-being score. The coefficient for "Well-being" was the additional effect to the log odds ratio of a student having a GPA in the given range as compared to having a GPA below 2.5 due to a one-unit change in the well-being score when food security/insecurity was held constant for each category. For instance, a food insecure student with a well-being score of 0 was $e^{-0.023} = 0.977$ times more likely to have a GPA in the range of 3.0–3.4 than to have a GPA below 2.5. That is, the student who was food insecure and also had a low well-being score was more likely to have a low GPA. Food security boosts the odds for a student, even with a well-being score of 0, to have a GPA within 3.0–3.4 instead of having a GPA below 2.5, as the said odd was $e^{(-0.023 + 0.990)} = e^{0.967} = 2.63$. The effect that the mediator, well-being, plays can be witnessed from the well-being coefficient. For the above two cases (food insecure and food secure students), having a well-being score of 3 would increase their odds of having a GPA in the 3.0–3.4 range as compared to the baseline (below 2.5), to $e^{(-0.023 + 0.541 \times 3)} = e^{1.6} = 4.95$ and $e^{(-0.967 + 0.541 \times 3)} = e^{2.59} = 13.33$ respectively. For a given food security condition, an increase in the well-being score by one point increases the respective odds of having a GPA of 3.5–4.0, 3.0–3.4 and 2.5–2.9 to $e^{0.518} = 1.68$, $e^{0.541} = 1.72$, $e^{0.359} = 1.43$.

Table 2. Coefficients, their standard errors, and significance levels for the model with food security mediated by well-being.

GPA category	Variable	Coefficient	Std. Error	Significance
"3.5–4.0"	Intercept	0.216	0.696	0.756
	Food Secure	1.446	0.390	<0.001
	Food Insecure	0	–	–
	Well-being	0.518	0.200	0.010
"3.4–3.0"	Intercept	−0.023	0.707	0.973
	Food Secure	0.990	0.395	0.012
	Food Insecure	0	–	–
	Well-being	0.541	0.203	0.008
"2.9–2.5"	Intercept	−0.394	0.768	0.608
	Food Secure	0.756	0.432	0.080
	Food Insecure	0	–	–
	Well-being	0.359	0.218	0.100

Sleep as a Mediator to Food Insecurity

Similar steps to detecting mediation by sleep on food insecurity were taken. The binomial logistic regression on food security by the mediator sleep was significant, χ^2 (1) = 20.860, $p < 0.001$, Nagelkerke pseudo-$R^2 = 0.027$. The final model with sleep as a mediator was a significant improvement over the model with only food security, χ^2 (3) = 10.145, $p = 0.017$. The Nagelkerke pseudo-R^2 for the final model was 0.031. The estimated coefficients for food security were lower in magnitude compared to the non-mediated model (see Table 3). The baseline group was GPA below 2.5. For each GPA category, the intercept is the log odds ratio of a food insecure student with 7 hours or more sleep having a GPA in the given range as opposed to having a GPA below 2.5. The coefficient for "Food Secure" in each GPA category is the additional effect to the log odds ratio of a food secure student with 7 hours or more sleep to have a GPA in the given range as opposed to having a GPA below 2.5. The additional effect to the log odds ratio of a food insecure student with less than 7 hours sleep having a GPA in the given GPA range as compared to a GPA below 2.5 is captured in the coefficient for "Less than 7 hours of sleep" in each category. The negative coefficient in each case implies that for a given food security condition, students deprived of at least 7 hours of sleep had a diminished chance of attaining a higher GPA

Table 3. Coefficients, their standard errors and significance levels for the model with food security moderated by sleep.

GPA Category	Variable	Coefficient	Std. Error	Significance
"3.5–4.0"	Intercept	2.778	0.450	<0.001
	Food Secure	1.488	0.386	<0.001
	Food Insecure	0	–	–
	Less than 7 hours of sleep	−1.233	0.422	0.004
	7 hours or more sleep	0	–	–
"3.4–3.0"	Intercept	2.553	0.454	<0.001
	Food Secure	1.060	0.390	0.007
	Food Insecure	0	–	–
	Less than 7 hours of sleep	−1.114	0.426	0.009
	7 hours or more sleep	0	–	–
"2.9–2.5"	Intercept	1.613	0.486	0.001
	Food Secure	0.729	0.428	0.089
	Food Insecure	0	–	–
	Less than 7 hours of sleep	−1.218	0.453	0.007
	7 hours or more sleep	0	–	–

than the baseline (below 2.5). In particular, students without 7 hours of sleep for a given food security condition had odds of attaining a GPA in the range 3.5–40, 3.4–3.0 and 2.5–2.9 $e^{-1.233} = 0.29$, $e^{-1.114} = 0.33$, $e^{-1.218} = 0.30$ times than what they would have had if they had 7 hours or higher sleep.

Well-being and Sleep as Mediators to Homelessness

Homelessness was not a significant predictor of GPA; $\chi^2(1) = 0.881$, $p = 0.83$, Nagelkerke pseudo-$R^2 = 0.001$. Thus, tests for the role of well-being and sleep as mediators of the association between homelessness and GPA were not conducted.

Discussion

In spite of common assumptions that college students tend to be economically advantaged, our findings reinforce recent studies indicating that college student food insecurity and homelessness occur at alarming rates. The rate of food insecurity among our participants was at the low end of other studies, but was still quite high at 15.49%. Prevalence of homelessness among students on our campus (9.47%) was high compared to rates reported in other published studies conducted at 4-year institutions. We hope these findings will serve as a call to action to community agencies that support food and housing security in the general population and encourage them to reach out to college campuses to serve this unique population.

An aim of this investigation was to move beyond description of prevalence rates to examine links among unmet basic needs and students' academic performance – as indicated by their grade point average – and their wellness. As expected, results showed that food insecurity in the prior month was associated with lower GPA, lower psychological well-being, and fewer hours of sleep compared to students who were food secure. Homelessness was associated with lower well-being and fewer hours of sleep, but not with students' GPA. Our study is one of the few that has been designed to examine potential mechanisms to explain the association between basic needs insecurity and grade point average. We found that psychological well-being and the typical number of hours students slept partially accounted for the link between food insecurity and GPA. That is, the lower GPA of students who were food insecure could be explained, in part, by the negative impact of food insecurity on students' overall wellness. Although this finding should be replicated and longitudinal data should be collected prior to making any sweeping recommendations, our results do provide support for campus efforts to enhance student wellness, especially in terms of psychological well-being and sleep. Counseling center and broader campus initiatives to increase students' well-being and sleep hygiene should intentionally target students likely to experience food insecurity, similar to the ways other high-risk groups such as student athletes are often targeted for wellness initiatives (Beauchemin, 2014). For example, campuses with food pantries might share information about the campus counseling center and local mental health resources with students who visit the pantry. Counseling centers should consider including questions about food security in their screening tools and make appropriate and immediate referrals to campus and community resources to address any unmet basic needs identified in the screening.

In contrast to findings related to food insecurity, homelessness in the past year was not associated with students' current grade point average. It is possible that some students experienced only brief episodes of homelessness or that episodes of homelessness were removed in time from the survey. For example, our residence halls closed during school breaks (e.g. spring break) so this was a high-risk time for students who were required to vacate their dorm rooms and had nowhere else to stay. Although this situation can be extremely stressful for students, those brief experiences might not be associated with their overall academic success. Likewise a single experience of homelessness many months ago might not have a significant impact on current GPA. Future studies should explore the length, timing, and frequency of homeless episodes to gain a better understanding of the conditions under which those experiences affect academic success, and whether wellness might serve as a mediator or as a buffer (i.e. a moderator) under certain circumstances.

This investigation extends knowledge of food insecurity and homelessness among college students in meaningful ways, but the study is not without methodological limitations that must be acknowledged. The cross-sectional nature of our study prevents us from drawing any conclusions about the direction of effects between basic needs insecurity and low wellness. It is possible that pre-existing struggles with physical and/or mental health challenges could lead to difficulties in securing stable housing and sufficient food. Longitudinal data will be necessary to disentangle the reciprocal effects of these variables over time. We examined GPA as the only indicator of academic achievement, and that indicator might not capture all the nuances of the association between basic needs insecurity and academic success. Thus, we agree with the recommendation of Payne-Sturges et al. (2018) for future studies to also consider retention and graduation rates, as those are perhaps more critical indicators of academic success than GPA and are the most meaningful outcomes in higher education. Finally, well-being is a broad and multifaceted construct including dimensions such as life satisfaction and happiness

(often referred to as subjective well-being), and psychological health and resilience (often referred to as psychological well-being) (see Keyes, Shmotkin, & Ryff, 2002). Our measure of well-being was a brief 5-item screening of current psychological adjustment. We recommend a comprehensive assessment of well-being in future studies to more effectively target intervention strategies to specific facets of this construct. Our study identified student wellness as one mediator that can account for the link between food insecurity and academic success, but it is likely that there are additional processes that can explain the link. Indeed, the full mediation model accounted for only a small proportion of variance in students' GPA. Future studies should explore other potential mediators, at the individual student level (e.g. physical health status) and at the structural level (e.g. availability of affordable housing options).

In closing, given evidence of high rates and negative correlates of food insecurity and homelessness among college students, and the relation between basic needs insecurity and poor wellness, universities and the communities in which they are located have an obligation to proactively prevent basic needs insecurity. There are very few tested models to prevent college student hunger and homelessness, but experts have suggested some innovative approaches to support homeless and vulnerable students (e.g. low-income students, students exiting the foster care system, single parents of young children) toward degree completion (e.g. Dworsky & Pérez, 2010; Huang, Fernandez, Rhoden, & Joseph, 2018). In addition, ensuring that college students with unmet basic needs have easy access to effective and affordable counseling to promote positive wellbeing could serve as an important protective factor for their academic success. Universities must acknowledge the high rates of food insecurity and homelessness among their students, view this challenge as an educational equity issue, and form meaningful partnerships with community-based organizations that have expertise in providing resources and services for these populations. Those organizations might not have a history of outreach to college students, so collaboration will be essential. Together, they can more effectively address this multidimensional problem and advocate for policies that support students in meeting their most basic needs on the path to higher education and economic stability.

Disclosure statement

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Notes on contributors

Mary E. Haskett is Professor of Psychology at North Carolina State University where her research team focuses on adjustment of children with a history of maltreatment and homelessness. She is currently conducting research on interventions to promote positive parenting and reduce risk of maltreatment among parents residing in emergency shelters and transitional housing. Dr. Haskett and her students are also exploring homelessness and food insecurity among college students. Dr. Haskett is a past president of the Section on Child Maltreatment of the APA Society for Child and Family Policy and Practice and is a Fellow of the American Psychological Association. In 2016, she was honored to be the recipient of the National Association for the Education of Homeless Children and Youth Staci Perlman Research award.

Suman Majumder is a Ph.D. candidate in Department of Statistics, North Carolina State University. He has completed his bachelor's and master's degree in Statistics from Indian Statistical Institute, Kolkata. His research interests include robust statistics and spatial statistics with application towards climate modeling and environmental science. During his bachelor's and master's degree he did extensive research on the theory and application of robust statistics which resulted in published papers and conference presentations. His current research topics are geared towards forecast corrections for PM2.5 and fusing large datasets obtained from multiple satellites to create a more consistent map of NDVI over the seasons.

A native of Germany, ***Dana Kotter-Gruehn*** obtained her B.S. and M.S. in Psychology from Dresden University of Technology and her Ph.D. in Psychology from the Free University, Berlin. Trained as a lifespan developmental psychologist, her research focuses on psychosocial development in adulthood and old age. More recently, her work in academic and student affairs has led to her involvement in research and initiatives pertaining to student food and housing insecurity. She currently serves as the director of undergraduate advising in the Department of Psychology at NC State University. She teaches a variety of courses (e.g. Research Methods, Psychology of Gender, Developmental Psychology), holds career workshops, and is involved in curriculum and course development in the Psychology department.

A native of Colombia, ***Indira Gutierrez*** is a PhD student at University of South Carolina. She has completed her bachelor's degree in Psychology with minors in Biology and Cognitive Sciences from North Carolina State University. Her research interests include food insecurity and the effect of nutrition on cognitive ability. During her bachelor's degree she did research on and became an advocate for collegiate food and housing insecurity efforts alongside Dr. Mary Haskett. She co-founded the NC State Basic Student Needs Coalition that immediately won the Deborah S. Moore Memorial Service Award. Her current research topics are geared towards the effects social determinants of health on health care adherence with Dr. Spencer Moore at the University of South Carolina.

ORCID

Mary E. Haskett http://orcid.org/0000-0002-9014-2883
Suman Majumder http://orcid.org/0000-0002-3678-5642

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