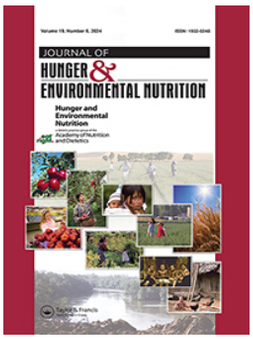

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Addressing College Student Food Insecurity: Grocery Pickup Program Needs Assessment

Latasha Neal[a], Jennifer Anziano[b], and Victoria A. Zigmont[a,b,c]

[a]Department of Health, Exercise Science and Recreation Management, University of Mississippi, Oxford, Mississippi, USA; [b]Department of Public Health, School of Health and Human Services, Southern Connecticut State University, New Haven, Connecticut, USA; [c]Center for Nutrition and Health Impact, Omaha, Nebraska, USA

ABSTRACT

Food insecurity is a detriment to the health and academic success of college students nationwide, increasing the need for innovative interventions. This cross-sectional study administered an online survey to 140 students attending a Northeastern public university to understand student interest in a student-sustained grocery program. The majority of students (53.6%) were food insecure (FI), measured with the USDA 6-item survey, as well as upperclassmen. Results identified that FI students may be most interested in a food pickup program that provides them with cooking classes, snack foods, and ingredients for 2–6 meals at a cost between $24.50 and $26.90 per week.

KEYWORDS

Food insecurity; college students; grocery; food assistance

Introduction

Recent literature has estimated that just over forty percent of college students across the nation experience food insecurity, a social condition that limits an individual's access to adequate food through barriers to availability, utilization, access, and stability.[1,2] The consequences of this disparity reach far beyond instances of experiencing hunger and is heavily correlated with nutritional insufficiencies, increased chronic illness, weakened immune systems, increased hospitalizations, as well as behavioral and emotional issues among food insecure students.[3–5] In addition to problematic physical and mental health outcomes, food insecurity is also associated with disruptions in sleep quality and concentration, increased stress levels, and poor academic performance and achievement. [4–6]

Researchers have devoted the past few decades to identifying risk factors of, barriers to, and consequences of food insecurity among college students, providing much needed insight into this epidemiological trend. These studies identified that students may be at risk of experiencing food insecurity for a plethora of reasons including; increased tuition and housing costs, limited income, complications accessing federal assistance and general lack of

CONTACT Victoria A. Zigmont vzigmont42@gmail.com Center for Nutrition and Health Impact, 14301 FNB Parkway, Suite 100, Omaha, NE 68154, USA

financial or food resources, management skills, and self-efficacy.[7–10] Literature has also posited that increased enrollment of non-traditional students has introduced another at-risk group, as these students as these students often struggle to self-manage their finances and place other life responsibilities before acquiring basic needs such as food.[11,12] Postsecondary institutions have taken initiatives to confront food insecurity among students such as by accessing internal resources and community partners and procuring grants and federal reserves to support students' basic needs.[13–16] On-campus food pantries have been the most common form of food assistance to be developed at institutions across the nation. The College & University Food Bank Alliance has seen an increase from 88 on-campus food pantries in 2012 to more than 800 in 2021.[14,16] However, time has shown food pantries are not sustainable solutions to the rise of basic need insecurities and often have significant limitations, such as difficulties with providing high-quality, fresh produce. Furthermore, the types of foods received at pantries may not line up with one's dietary needs or preferences, which acts as an added barrier to utilization of food pantries.[17] Additional food supports have also been cultivated, including meal vouchers or redistribution,[13–15] emergency fund distribution,[13,14] on-campus community gardens, and educational programs for federal benefits,[13,15] and strengthening food efficacy.[13,14,15,18] This range of innovation has prompted investigation into student utilization of food support programs and the barriers to the use of these programs.

Despite increased understanding of the contributing factors to food insecurity in college students, many students still struggle to have consistent access to an adequate quantity and quality of food to meet their nutritional needs. As time has passed, researchers have begun to incorporate more qualitative data in their work to better understand barriers to food security and develop more efficacious solutions relative to specific populations, utilizing input from those impacted – food insecure college students. In their study of students' perception of food resources, Conrad and colleagues (2022) found student food insecurity to be influenced by three factors: personal beliefs, life skills, and the academic institution.[18] According to the researchers, *personal beliefs* included access and knowledge of resources, what it means "to need," and available time.[18] *Life skills* included food attainment prior to college, implementation of meal schedule and resourcefulness, while *the academic institution* included student outreach, interpersonal interactions, and meal plans.[18] These themes are relatively consistent with similar studies that have indicated that barriers to food security exist within institutional food resource and support structures, as well as personal biases and social perceptions.[17,19,20] In their investigation of student food insecurity and utilization of the on-campus food pantry, El Zein and colleagues (2018) identified four obstacles to receiving support among their sample: insufficient information on pantry operations, inconvenient hours of operation, social stigma and embarrassment, and

implications associated with self-identity.[20] Peterson and colleagues (2022) agreed, finding lack of knowledge and social stigma preventing their sample of students from accessing the institutional support offered.[21] Going beyond identifying barriers to food support that must be overcome, Ilieva and colleagues (2019) described the high value students place on their feedback being considered by school administrators, preferring to work in collaboration to problem-solve solutions to campus food insecurity, address the difficulty of accessing food resources, and increase social support in navigating their institutional foodscapes.[22]

This study builds on prior research at this institution where researchers completed 1:1 interviews with undergraduate students to better understand their experiences with food insecurity.[23] These interviews revealed that food insecure students faced barriers rooted in finances, time management, and lack of resources or skills for healthy eating. While students reported negative impacts on their academics from food insecurity, their coping mechanisms prioritized cost and convenience over food quality, possibly exacerbating their situation.[23] The food insecurity risk factors that were identified in this study included: (1) financial barriers to affording food, (2) lack of time for shopping, cooking, and eating, (3) inability to cook due to lack of skills or finances, (4) lack of transportation, (5) time and money demands on commuter students, (6) family history of financial struggles or food insecurity.[23] The results of these interviews were then used to inform a quantitative needs assessment for the potential creation of a new grocery pickup program on campus. The current study describes the results of that needs assessment.

The present study summarizes the results of a needs assessment for a grocery pickup program. The aims of the study were to: 1) report on current student use of existing food assistance programming at the university, 2) collect student feedback about how these existing programs can be improved, 3) measure student interest in a grocery pickup program, including how food insecurity is associated with student interest and, 4) gather information identifying student interest in specific aspects of the program including food items students would like to see provided and how much students would be willing to pay for a bag of groceries based on its contents.

Materials and Methods

Data Collection Procedures

This needs assessment measured interest in a grocery pickup program among undergraduate college students attending a state public university in New England. This cross-sectional study was conducted in 2019, when the undergraduate population at this university was primarily made up of white (49%), female (61%), and full-time (85%) students.[24] Several food

resources currently exist on this campus, such as a mobile-food pantry, small on-campus food pantry run by the public health department, a meal swipe donation program, and a free peanut butter and jelly program (PB&J Program). Current levels of utilization of these programs are discussed in the results of this study.

An online survey was designed to collect information regarding student use of university food assistance programs, feedback on how these existing programs can be improved, and student interest in a grocery pickup program. The online survey was advertised to all students during Spring 2019 after obtaining IRB approval (number 19–079). As an incentive for participation, students were entered into a lottery to win one of four $20.00 gift cards to the local supermarket chain. Recruitment was conducted by distributing fliers across campus as well as e-mails to list servers and student groups. Non- random sampling was used to recruit food insecure students by sharing flyers for the survey in the university wellness center, public health department food pantry, and a mobile food pantry that frequently visited campus, where more food insecure students were likely to spend time

Additionally, classes were randomly selected for visits by two public health students who were hired as research assistants for recruitment. These student research assistants randomly selected classes using the university roster at dates and times that worked for them. Research assistants reached out to professors explaining the purpose of the survey and asked for permission to visit their class during the first or last 5 minutes of class time. After getting permission from the professor and arranging a date and time to come, the research assistants visited the class and passed out a QR code to the survey while explaining the study purpose to the students. Potential participants were let known that their participation in the survey was completely optional and would not affect their performance in the current class. Some professors allowed students who were interested to complete the survey during class time, otherwise students were encouraged to complete the survey when they were able.

The first page of the online survey presented the students with information needed for informed consent: including information on the study purpose, the time needed to complete the survey, how study findings would be made available, and statements on the anonymity, confidentiality, and potential risks of the study. Students were also provided with information to contact the primary research for university Human Research Protection Program if they had questions or concerns about their participation in the study. At the end of this form, students were able to select a check box stating if they consented to the survey. If students consented, they were brought to the survey questions. If students did not consent, the survey ended without presenting the survey questions.

Measures

The online survey administered to students measured their characteristics, food assistance programs use, and food program interest. This included multiple-choice, Likert scale and open-ended questions regarding the use of current food programs on the university campus and how these programs can be improved. The survey also asked students questions about their year in school, living situation, transportation access, self-rated cooking ability (measuring cooking self-efficacy), access to perishable food storage, and food security status. These questions have been used previously at the university where this study was conducted.[23,25]

All students were asked about their current use of programs on campus that address food security including the Mobile Food Pantry, Public Health Food Pantry, Psychology Department Food Events, Swipe it Forward (meal swipe donation), and Peanut Butter and Jelly (PB&J) Program. The PB&J program set up a station in one of the academic buildings every week for students to make peanut butter and jelly sandwiches for free.

Food security status was measured using questions from the U.S. Department of Agriculture (USDA) Household Food Security Survey Module: 6-item short form. The six items on the food insecurity scale were developed to estimate one's food security status (in the previous 12 months) and have been utilized with similar study populations. Self-rated cooking ability was measured with one question that asked students to rate their cooking abilities on a scale of 1 ("do not know how to cook") to 10 ("know how to cook"). Similar questions are presented to college students in other food security studies.[26,27]

Additionally, students were asked about their overall interest in a grocery pickup program and then were further asked about their interest in specific program components, such as being provided cooking classes or ingredients to cook. The survey ended by asking students about the quantity of food they would like to see in a grocery bag and how much they would be willing to pay for such a bag. The questions for this survey were taken from existing instruments, or written by the research team, and program developers, who have expertise in college food insecurity. The survey questions were pilot tested with graduate and undergraduate students who part of the target group prior to use were using both oral and written feedback, to ensure face validity, and identify any skip logic gaps in the survey instrument. The survey instrument is provided in Appendix A.

Statistical Analysis

Based on their response to the food security questions, students were categorized as having high or marginal food security, low food security, and very low food security. This is consistent with the assessment procedures developed by the USDA and has been found to be a valid and reliable measure of food security.[28,29]

Participant characteristics were measured through descriptive statistics, such as frequencies, percentages for categorical variables and means, and standard deviations for continuous, normally distributed variables. Pearson's Chi-square tests were utilized to examine the association between food security status and student use of university food assistance programs, as well as interest in a grocery pickup program. T-tests were used to compare continuous, normally distributed variables that differed between the two groups. Data from students who said they were interested in the program were analyzed separately to see if their cooking abilities differed based on their interest in the program. Analyses were performed using STATA version 14[30] and $p < 0.05$ was used as the threshold for statistical significance.

Results

Demographic Characteristics

A total of 140 college students responded to the survey and were included in this analysis; participant demographic characteristics are shown in Table 1. Most students who participated in this study were undergraduates ($n = 130$, 92.9%) versus graduate students ($n = 9$, 6.5%). Most undergraduate students

Table 1. Student participant characteristics ($N = 140$).

	n	%
Year in College		
Freshman	12	8.6
Sophomore	22	15.8
Junior	36	25.9
Senior	60	43.2
Graduate Student	9	6.5
Residence		
On Campus – Dorms (kitchen on my floor)	28	20.0
On Campus – Apartment (kitchen)	17	12.1
Off Campus – with (kitchen access)	95	67.9
Perishable Food Storage		
Community Fridge	7	5
Fridge in Dorm or Apartment	45	32.4
Fridge in house	85	61.2
Not available	2	1.4
Transportation^		
Own car or share with friends or family	109	77.9
Ride a bike or skateboard	5	3.6
Rely on friends or family	23	16.4
Other – (train or walking)	5	3.6
Total Food Security Score		
High or Marginal Food Security (0 or 1)	65	46.4
Low Food Security (2–4)	43	30.7
Very Low Food Security (5–6)	32	22.9
Food Insecurity (Binary score)		
Not Food Insecure (high or marginal food security)	65	46.4
Food Insecure (low or very low food security)	75	53.6
	mean	**SD**
Cooking Ability Rating ($n = 138$)	7.39	2.31

^able to pick multiple answers.

represented were upperclassmen, with seniors making up 43.2% ($n = 60$) of the survey population.

Approximately 68% ($n = 95$) of students lived off campus with kitchen access. Relatedly, most students also had access to perishable food storage in the form of a fridge available in their house (61.2%, $n = 85$). Of those students living on campus, 20% ($n = 28$) lived in dorms with kitchens on the floors of their dorms; 32.4% ($n = 45$) had a fridge available in their dorm or apartment. The remainder of students (12.1%, $n = 17$) lived on campus in apartment-style housing with kitchen access. About 5% ($n = 7$) of students reported having a community fridge, while only 1.4% ($n = 2$) reporting having no access to a fridge or perishable food storage.

Most students (77.9%, $n = 109$) either owned their own car or shared a car with their friends or family. Another 16.4% ($n = 23$) rely on friends or family for transportation. Other reported modes of transportation were riding a bike, skateboarding, walking or taking the train (3.6%, $n = 5$). The majority of students (53.6%, $n = 75$) participating in the survey were considered food insecure, 30.7% ($n = 43$) experiencing low food security and 22.9% ($n = 32$) of students experiencing very low food security. Students participating in the survey self-rated their cooking ability on a scale of 1 (low cooking ability) to 10 (high cooking ability). The average cooking ability rating for the students in this survey was 7.39 (SD = 2.31).

Food Assistance Program Use

Student food program use and food security status were compared in Table 2. Results of this study found that nearly 83% of food insecure students were using at least one type of food assistance program that is offered on campus, representing an overall significant difference in program use amongst food insecure and food secure students ($\chi_1^2 = 10.00$, $p = .002$). In other words, a higher proportion of food insecure students utilized these programs than food secure students. This was true for all the mentioned programs, except the PB&J and Swipe it Forward programs where there were no significant differences in program use amongst food insecure and food secure students.

The most used program was the PB&J program (51.8% of students used this program). Participation in this program was not related to student food insecurity. The second most used program was the Mobile Food Pantry (13.1%). Participation in this program was associated with student food insecurity status ($\chi_1^2 = 5.29$, $p = .021$), with a higher proportion of food insecure students (19.4%) utilizing the program than food secure students (6.2%). Students were asked about their participation in two aspects of the Swipe it Forward program: meal swipe donation and meal swipe receipt. A small percentage of students donated meals to the Swipe it Forward program (11.0%); participation in this aspect of Swipe it Forward was not associated with student food insecurity. Nearly 6% of

Table 2. Student's use of programs to address food insecurity ($N = 140$).

	Total		Food Secure		Food Insecure			
Program Use	n	%	n	%	n	%	Chi Square (df)	*p*-value
Any Program Use							10.00 (1)	**0.002**
Yes	100	71.4	38	58.5	62	82.7		
No	40	28.6	27	41.5	13	17.3		
PB & J Program							1.59 (1)	0.207
Yes	71	51.8	30	46.2	41	56.9		
No	66	48.2	35	53.9	31	43.1		
Mobile Food Pantry							5.29 (1)	**0.021**
Yes	18	13.1	4	6.2	14	19.4		
No	119	86.9	61	93.8	58	80.6		
Public Health Food Pantry							6.07 (1)	**0.014**
Yes	10	7.3	1	1.5	9	12.5		
No	127	92.7	64	98.5	63	87.5		
Psychology Food Events							4.68 (1)	**0.030**
Yes	5	3.7	0	0.0	5	6.9		
No	132	96.4	65	100.0	67	93.1		
Swipe it Forward – Donated Meal(s)							2.92 (1)	0.088
Yes	15	11.0	4	6.2	11	15.3		
No	122	89.0	61	93.9	61	84.7		
Swipe it Forward – Received Meal(s)							4.16 (1)	**0.041**
Yes	8	5.8	1	1.5	7	9.7		
No	129	94.2	64	98.5	65	90.3		

students received meals from Swipe it Forward; this was associated with student food insecurity; ($\chi_1^2 = 4.16$, $p = .041$) A higher proportion of food insecure students (9.7%) received meals from the program than food secure students (1.5%). The Public Health Food Pantry was used by 7.3% of students overall; participation in this program was associated with student food insecurity status ($\chi_1^2 = 6.07$, $p = .014$); a higher proportion of food insecure students utilize the program (12.5%) than food secure students (1.5%). The least used food program in this study were the Psychology food events; this program was only utilized by 3.7% of students. The only students to report using this program were food insecure.

Grocery Pickup Program Interest

Student interest in the potential components of a grocery pickup program across food security status is summarized in Table 3. Overall, food insecure students expressed a significantly greater interest in the grocery pickup program compared to food secure students ($\chi_1^2 = 15.27$, $p < .001$). Almost three quarters of food insecure students (72.0%) expressed that they would be interested in a grocery pickup program, compared to 39.1% food secure students. The specific components of the program that were more commonly of interest for food insecure students, compared to their food secure peers, were the provision of snack foods, ingredients to cook, and cooking classes. Roughly three quarters of food insecure students (73.3%) either agreed (41.3%) or strongly agreed (32.0%) that the grocery pickup program should provide snack foods

Table 3. Student interest in the grocery pickup program and different program components ($N = 140$).

	Total		Food Secure		Food Insecure		Chi Square (df)	p-value
Program Components	n	%	n	%	n	%		
Interested in the Grocery Pick Up Program							15.27 (1)	**<0.001**
Yes	79	56.8	25	39.1	54	72.0		
No	60	43.2	39	60.9	21	28.0		
Snack Foods							11.54 (4)	**0.021**
Strongly Agree	39	28.7	15	24.6	24	32.0		
Agree	46	33.8	15	24.6	31	41.3		
Neutral	32	23.5	21	34.4	11	14.7		
Disagree	5	3.7	4	6.6	1	1.3		
Strongly Disagree	14	10.3	6	9.8	8	10.7		
Drinks							7.80 (4)	0.099
Strongly Agree	30	22.1	10	15.9	20	27.4		
Agree	49	36.0	20	31.8	29	39.7		
Neutral	32	23.5	20	31.8	12	16.4		
Disagree	7	5.2	5	7.9	2	2.7		
Strongly Disagree	18	13.3	8	12.7	10	13.7		
Ready to Eat Foods							6.82 (4)	0.146
Strongly Agree	45	33.6	16	27.1	29	38.7		
Agree	49	36.6	20	33.9	29	38.7		
Neutral	27	20.2	16	27.1	11	14.7		
Disagree	5	3.7	4	6.8	1	1.3		
Strongly Disagree	8	6.0	3	5.1	5	6.7		
Ingredients to Cook							9.69 (4)	**0.046**
Strongly Agree	49	36.0	16	26.2	33	44.0		
Agree	33	24.3	12	19.7	21	28.0		
Neutral	33	24.3	20	32.8	13	17.3		
Disagree	8	5.9	5	8.2	3	4.0		
Strongly Disagree	13	9.6	8	13.1	5	6.7		
Recipes Using the Stove							3.94 (4)	0.414
Strongly Agree	40	29.6	15	25.0	25	33.3		
Agree	41	30.4	17	28.3	24	32.0		
Neutral	34	25.2	17	28.3	17	22.7		
Disagree	5	3.7	4	6.7	1	1.3		
Strongly Disagree	15	11.1	7	11.7	8	10.7		
Recipes Using the Microwave							3.44 (4)	0.487
Strongly Agree	38	27.7	14	22.2	24	32.4		
Agree	45	32.9	20	31.8	25	33.8		
Neutral	36	26.3	19	30.2	17	23.0		
Disagree	4	2.9	3	4.8	1	1.4		
Strongly Disagree	14	10.2	7	11.1	7	9.5		
Cooking Classes							11.53 (4)	**0.021**
Strongly Agree	47	34.8	17	28.3	30	40.0		
Agree	32	23.7	9	15.0	23	30.7		
Neutral	31	23.0	18	30.0	13	17.3		
Disagree	8	5.9	6	10.0	2	2.7		
Strongly Disagree	17	12.6	10	16.0	7	9.3		

($\chi_4^2 = 11.54$, $p = .021$). Similarly, 72% of food insecure students either agreed (28.0%) or strongly agreed (44.0%) that the grocery pickup program should provide ingredients to cook ($\chi_4^2 = 9.69$, $p = .046$). Additionally, 70.7% of food insecure students either agreed (30.7%) or strongly agreed (40.0%) that the grocery pickup program should provide cooking classes ($\chi_4^2 = 11.53$, $p = .021$).

Students were asked about which types of food and how much food they would like to see in the grocery bag (Table 4). Overall, more than half of

Table 4. Student interest in specific food items in the bag ($N = 140$).

	Total		Food Secure		Food Insecure			
Item of Interest	n	%	n	%	n	%	Chi Square (df)	p-value
Snacks for the week							1.58 (1)	0.209
Yes	79	56.4	33	50.8	46	61.3		
No	61	43.6	32	39.2	29	38.7		
Drinks for the week							0.119 (1)	0.729
Yes	56	40.0	25	38.5	31	41.3		
No	84	60.0	40	61.5	44	58.7		
Food for 2–6 meals							15.016 (1)	**<0.001**
Yes	72	51.4	22	33.9	50	66.7		
No	68	48.6	43	66.1	25	33.3		
Food for 7–14 meals							0.387 (1)	0.534
Yes	49	35.0	21	32.3	28	37.3		
No	91	65.0	44	67.7	47	62.7		
Food for 15–21 meals							0.165(1)	0.684
Yes	19	13.6	8	12.3	11	14.7		
No	121	86.4	57	87.7	64	85.3		

students were interested in obtaining snacks for the week (56.4%), followed by food for 2–6 meals (51.4%). A higher proportion of food insecure students were interested in being provided food for 2–6 meals (66.7%) compared to food secure students (33.9%) ($\chi_1^2 = 15.016$, $p < .001$). Patterns in the proportions of responses also show that food insecure students were also interested in being provided snacks for the week through the program (61.3%), though this difference between food secure and food insecure students was not statistically significant ($p > .05$).

Students were asked how much they would pay for a bag of groceries based on its contents (Table 5). For students interested in the program ($n = 71$), the largest group of students (20.3%) were interested in a grocery bag containing only 2–6 meals. On average, students interested in this type of grocery bag would be willing to pay $24.50. The second largest group were interested in a grocery bag containing 15–21 meals, drinks, and snacks (13.9%). On average,

Table 5. Student interest in specific items and payment amounts. ($N = 71$).

	Total					
Item of Interest	n	%	Average Pay	Median Pay	Min Pay	Max Pay
Drinks only	2	2.5	0	0	0	0
Snacks only	1	1.3	–	–	–	–
Drinks & Snacks only	4	5.1	$53.75	$47.50	$20	$100
2–6 meals only	16	20.3	$24.50	$28.75	0	$50
2–6 meals & drinks	1	1.3	–	–	$30	$30
2–6 meals & snacks	8	10.1	$40.00	$45.00	0	$75
2–6 meals & drinks & snacks	8	10.1	$30.00	$30.00	0	$50
7–14 meals only	8	10.1	$60.00	$55.00	0	$150
7–14 meals & drinks	0	0.0	–	–	–	–
7–14 meals & snacks	2	2.5	$50.00	$50.00	$50	$50
7–14 meals & drinks & snacks	8	10.1	$46.88	$47.50	0	$100
15–21 meals only	1	1.3	–	–	0	$50
15–21 meals & drinks	0	0.0	–	–	–	–
15–21 meals & snacks	1	1.3	–	–	$45	$45
15–21 meals & drinks & snacks	11	13.9	$39.50	$30.00	0	$100

students interested in this type of grocery bag would be willing to pay $39.50. There was no association observed between access to refrigeration and student interest in receiving a grocery bag with 2–6 meals for this program ($\chi_3^2 = 2.534$, $p = .469$), however 97% of students in this sample had access to a fridge to store perishable foods.

Student interest in the grocery program was compared across different student characteristics (Table 6). Analysis shows that residence, access to perishable food storage, mode of transportation, and self-rated cooking ability were all significantly related to interest in the grocery pickup program. Specifically, food insecure students living off campus (with a kitchen) were significantly more interested in a grocery pickup program (54.4%; $\chi_2^2 = 16.856$, $p < .001$), compared to students living on campus in a dorm (floor kitchen) (30.4%) or apartment (with kitchen) (15.2%). Students who had a fridge in their house (43.0%) or no fridge available (49.4%) for perishable food storage were significantly more interested in a grocery pickup program ($\chi_3^2 = 12.104$, $p = .007$), compared to students

Table 6. What are the demographic characteristics of students who are the most interested in the grocery pick up program? ($N = 140$).

	Not Interested		Interested			
Demographic Characteristics	n	%	n	%	Chi Square (df)	*p*-value
Year in College					1.847 (4)	0.764
Freshman	3	5.1	9	11.4		
Sophomore	9	15.3	13	16.5		
Junior	16	27.1	20	25.3		
Senior	27	45.8	32	40.5		
Graduate Student	4	6.8	5	6.3		
Residence					16.856 (2)	**<0.001**
On Campus – Dorms (floor kitchen)	4	6.7	24	30.4		
On Campus – Apartment (kitchen)	4	6.7	12	15.2		
Off Campus (kitchen)	52	86.7	43	54.4		
Perishable Food Storage					12.104 (3)	**0.007**
Community Fridge	0	0.0	2	2.5		
Fridge in Dorm or Apartment	3	5.0	4	5.1		
Fridge in house	11	18.3	34	43.0		
Not available	46	76.7	39	49.4		
Transportation^						
Own car or share with friends/ family					8.368 (1)	**0.004**
Yes	54	90.0	55	69.6		
No	6	10.0	24	30.4		
Ride a bike or skateboard					1.135 (1)	0.287
Yes	1	1.7	4	5.1		
No	59	98.3	75	94.9		
Rely on friends or family					5.157 (1)	**0.023**
Yes	5	8.3	18	22.8		
No	55	91.7	61	77.2		
Other – (Train or walking)					1.135 (1)	0.287
Yes	1	1.7	4	5.1		
No	59	98.3	75	94.9		
	mean	SD	mean	SD	**T-Test**	**p-value**
Self- Rated Cooking Ability	7.57	2.14	7.27	2.44	0.748 (133)	0.456

^*able to pick multiple answers.*

who had a community fridge (2.5%) or a fridge in their dorm or apartment (5.1%).

Students who neither own their own car nor share one with their friends/family (69.6%) and students who rely on friends or family for transportation (22.8%) were significantly more interested in the grocery program compared to students who do own their own car or shared one with friends or family (90.0%,) or did not rely on friends or family for transportation (8.3%). Interested students were also more likely to ride a bike or skateboard or use other forms of transportation (5.1%) than students not interested. Overall, these findings show that students with unreliable or limited access to transportation are most interested in the grocery pickup program. No differences were observed in the average cooking ability rating based upon interest in the program (mean = 7.57) and students not interested in the program (mean = 7.27) ($t(133) = 0.748$, $p = .456$).

Operational Considerations

In examining literature on student food insecurity, Landry and colleagues (2023) identified six (of 19) research gaps that exist within evaluation of the impact, sustainability, and cost effectiveness of existing food programs and initiatives.[31] They developed a model providing actionable steps toward addressing these gaps in literature and food insecurity, imploring that advancing student food security requires, "a nuanced, integrated and collaborative approach leveraging researchers, campus and community stakeholders."[31] This requires campus stakeholders and off-campus advocates to work as a collective force in catalyzing the resolution of student food insecurity.[31,32] Practical action steps toward developing long-term food support programs includes conducting campus needs assessments to discern the barriers unique to each university and developing programs that address these identified barriers, as demonstrated in the present study. This approach also suggests that operational barriers to such programming implementation and facilitation can be diminished through mobilization of community collaborators. In this multifunctional conceptualization of a grocery pickup program, there are many factors that may not be successfully fulfilled in the absence of support. In the time since this study was conducted in 2019, the study institution has developed a spacious on-campus food pantry facility that would make accommodation of the current program feasible, execution of all program facets cannot be guaranteed in the absence of like-minded collaborators. Examples of operational considerations and potential collaborative resolutions specific to this grocery pickup program are provided in Table 7.

Table 7. Operational considerations and potential collaborative resolutions specific to this grocery pickup program.

Operational Considerations	Potential Collaborative Resolutions
Reserve of nutritious and bulk food supplies to provide two to six meals for each student participant.	Leveraging existing food pantry supplies and resources (such as campus garden).
Financial logistics to accommodate an equitable cost for students.	Accessing community grants or philanthropic contributions.
Food ingredients with multicultural and dietary considerations.	Increased access to imported goods through engagement with multicultural establishments and markets in the surrounding community and development of a collection tool for student feedback on preferences.
Construction and facilitation of the proposed cooking classes.	Partnership with culinary establishments in the community that would supply and facilitate the sessions.

Discussion

Previous studies on college student food insecurity have indicated that students' ability to access food resources is mainly influenced by factors rooted in personal beliefs, life skills, and individual academic institutions. [16, 17–22, 23] Developing food support programs that aim to alleviate determinants found within each domain may improve students' quality of life, in addition to cultivating a healthy and substantial diet. Within the institution of the present study, identified risk factors to student food insecurity included: (1) financial barriers to affording food, (2) lack of time for shopping, cooking, and eating, (3) inability to cook due to lack of skills or finances, (4) lack of transportation, (5) time and money demands on commuter students, (6) family history of financial struggles or food insecurity.[23] A previous study also determined that the prices of various food sources on this campus are high due to convenience pricing, creating additional cost barriers for food insecure students.[25] Providing students with a grocery pickup program may address the barriers of time (for grocery shopping), transportation (to or from the supermarket), knowledge of what to buy, knowledge of how to prepare foods (cooking classes and/or recipes are provided to students), and finances (prices could be subsidized for food insecure students).

The results of the current analysis revealed substantial interest among food insecure students for a grocery pickup program on this public, diverse, state university campus which would provide students with snack foods and ingredients to cook two to six meals per week. Students were also interested in being provided with cooking classes as part of the grocery pickup program. Differences were not observed in self-rated cooking ability between students who were and were not interested in the programming. Overall, cooking ability scores were consistent with previous findings,[33] with a relatively high mean value of 7.39 (out of 10 possible points). While literature has not thoroughly examined the relationship between cooking self-efficacy and

food security status, associations have been identified between food insecurity and lower confidence in cooking ability and preparation.[7,33] According to Knol and colleagues (2019), the food insecure students within their sample experienced significantly lower confidence in tasks such as following a recipe, cooking a meal within a short time period, cooking a nutritious meal and doing so without spending a lot of money, when compared to food secure students.[33] Offering cooking classes would be a beneficial and sustainable intervention as the majority of students interested in the program were considered food insecure; it is possible that these students may not have the cooking resources, knowledge or skills to consistently cook for themselves. Furthermore, Bandura's theory of self-efficacy would suggest that cooking classes would likely improve students' cooking abilities, which may also increase their confidence, or perceived self-efficacy, in meal management and utilization of food supports.[33,34]

The most requested grocery bag by students would contain the food supplies for two to six meals. The average price students who were interested in the program would be willing to pay for such a grocery bag was $24.50, slightly lower than the overall student average of $26.90. As students who reported interest in the program were mostly students considered food insecure, it is possible the average price they would be willing to pay for program services is lower because of limited financial resources and competing financial demands, such as tuition, institutional fees and housing, that may contribute to their food insecure status.[5,7–10,13] These students may have less money to budget for food expenses than the general student population. In taking an average of the two prices, charging students a price of about $25.70 for a bag of groceries that would provide students with two to six meals is a relatively low cost for such a quantity. Furthermore, providing these services at such an equitable cost to students may encourage them to take responsibility for the sustainability of the program, as it is not just a handout given to them. As aforementioned, food insecure students are emotionally, intellectually, and physically engaged in policies and practices that contribute to campus foodscapes and place value on institutional awareness of and willingness to address the issue of food insecurity on campus.[22] By utilizing bottom-up approaches to resolving student food insecurity, as that described in the present study, student perspectives can be acknowledged, and solutions can be cultivated based on the campus population and food needs. This methodology may also instill trust in academic institution aid, reduce the student stigma related to with accessing programming, increase food support utilization and ultimately decrease food insecurity among students.[13,18,22]

As the purpose of this study was to evaluate the need and interest in a grocery pickup program that would help address the barriers that prevented students from accessing adequate quantity and quality of food, data was not collected on specific food items that students wanted to see in these grocery

bags. Ideally, students would have the freedom to select which items they want to receive in their grocery bag, and these would be healthy options that require minimal cooking ability to promote a nutritious diet for those students who may not otherwise be able to access one. Literature has observed lower intakes of healthy food options, such as vegetables, fruits and whole grains, and higher consumption of unhealthy food options, such as fast foods and added sugars among food insecure students.[35] Other research completed with student athletes at the current study institution found that the campus dining hall has limited access to fresh fruits and vegetables and other healthy options.[36]

Furthermore, food insecurity is heavily associated with disordered eating behaviors among students, such as the inability to eat balanced meals, skipping meals, eating less than desired, or eating snacks instead of meals.[5,23,35,36] In their examination of food insecurity and health outcomes, Bruening and colleagues (2016) found their food insecure, freshmen sample to have significantly lower odds of consuming home-cooked meals, eating breakfast, and perceiving their off campus food habits to be healthy, in comparison to their food secure peers.[37] Poor diet quality and daily eating habits among food insecure students are consequences of the social condition, as Zigmont et al. (2019) revealed that these students often participate in these behaviors in prioritizing cost and convenience over the quality of their food options.[23] Hopefully, by providing easier access to nutritious foods, food insecure students may also benefit from an improved, healthier diet.

Additionally, as a large portion of food insecure students in the current study population who are interested in the program reported struggles with reliable transportation access, being able to be provided with supplies to make several weekly meals at once helps these students worry less about having to find transportation to get food. As the study university is composed of students from a variety of diverse backgrounds, providing culturally appropriate foods and recipes in the grocery bags is another consideration that should be made. Both lack of proper refrigeration and appropriate variety of food choices to meet dietary preferences and needs are both barriers to food bank usage as reported by Kihlstrom et al. (2019).[17]

Limitations of this study include a relatively small sample size ($N = 140$) consisting of mostly junior and senior undergraduate students. Therefore, this data may not accurately represent the wants and needs of freshman and sophomore students. However, the information gained from this short survey informs programmatic development from a student perspective and aligns with prior work among this food insecure student population. Future work includes obtaining funding for future programming, which can be used to purchase supplies needed to implement the program, such as reusable bags, salary for staff, interns, or volunteers, and food items. This study also did not collect financial data from students, therefore we are unable to understand how

current income or employment status influences student interest in the grocery pickup program, or the price students would be able or willing to pay. As income would be a major driver in students' ability to pay and feasibility in utilizing this program, further similar research on food programming for college students should consider assessing student income in their measures.

Conclusion

Food insecurity continues to be a prevalent problem amongst students; high rates of student food insecurity provide justification for further interventions and programs on campus to help alleviate food insecurity amongst the students. As previous studies have asserted, developing, raising awareness, and normalizing *innovative* and *targeted* on-campus food assistance programs is crucial to combating the common food security barriers of social stigma, inconvenient hours of support operations, and lack of program knowledge or transportation.[31]

To address the barriers that students face to food security, this study proposes designing and piloting a grocery pickup program for students attending the study institution. This needs assessment revealed that students are interested in such a program, and identified which specific program components students would be interested in having as part of the program. This grocery pickup program addresses issues of food insecurity by allowing students to cut out time to go shopping off campus for groceries and alleviate barriers for students facing transportation issues. The proposed supplemental cooking classes can increase the cooking self-efficacy of students, elevating their confidence in related food responsibilities. The food that is given out will be healthy and promote healthy choices for students and, hopefully, decrease consumption of unhealthier food options. Results from this study indicated that food insecure students may be very interested in being provided snacks, ingredients, and even cooking classes through a grocery pickup program. Through this needs assessment, this study should inform the generation and development of efficacious, sustainable food support programs for college students.

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ORCID

Victoria A. Zigmont http://orcid.org/0000-0002-3747-4328

Author Contributions

V.Z. obtained funding and conceptualized the manuscript, J.A. and V.Z., wrote and edited the manuscript, conducted the analyses, and researched data. L.N wrote and edited the manuscript. All authors reviewed and commented on subsequent drafts of the manuscript.

References

1. Nikolaus CJ, An R, Ellison B, Nickols-Richardson SM. Food insecurity among college students in the United States: a scoping review. *Am Soc nutr*. 2020;11(2):327–348. doi:10.1093/advances/nmz111.
2. U.S. Department of Agriculture [USDA]. USDA ERS -Definitions of food security. USDA Economic Research Service. 2022.
3. Nourish NC. Hunger facts. Nourish NC. n.d.
4. Martinez SM, Frongillo EA, Leung C, Ritchie L. No food for thought: food insecurity is related to poor mental health and lower academic performance among students in California's public university system. *J Health Psychol*. 2020;25(12):1930–1939. doi:10.1177/1359105318783028.
5. El Zein A, Shelnutt KP, Colby S, et al. Prevalence and correlates of food insecurity among U.S. college students: a multi-institutional study. *BMC Public Health*. 2019;19(1):1–12. doi:10.1186/s12889-019-6943-6.
6. Nagata JM, Palar K, Gooding HC, et al. Food insecurity is associated with poorer mental health and sleep outcomes in young adults. *J Adolesc Health*. 2019;65(6):805–811. doi:10.1016/j.jadohealth.2019.08.010.
7. Gaines A, Robb CA, Knol LL, Sickler S. Examining the role of financial factors, resources, and skills in predicting food security status among college students. *Int J Consum Stud*. 2014;38(4):374–384. doi:10.1111/ijcs.12110.
8. Knol LL, Robb CA, Mckinley EM, Wood M. Food insecurity is related to financial aid debt among college students. *J Fam Consum Sci*. 2018;110(4):35–41. doi:10.14307/JFCS110.4.35.
9. Goldrick-Rab S, Richardson J, Hernandez A. Hungry and homeless in college: results from a national study of basic needs insecurity in higher education. *Wis HOPE Lab*. 2017:1–17.
10. Payne-Sturges DC, Tjaden A, Caldeira KM, Vincent KB, Arria AM. Student hunger on campus: food insecurity among college students and implications for academic institutions. *Am J Health Promot*. 2018;32(2):349–354. doi:10.1177/0890117117719620.
11. Beam MJ. *The Implications of Food Insecurity on the Academic Performance of Nontraditional Students* [dissertation]. Rochester, MI: Oakland University; 2019.
12. Mowreader A. *Report: Addressing the Roots of Food Insecurity in Higher Ed. Inside Higher Ed*. December 11, 2023. [cited January 25, 2024]. Available from: https://www.inside

highered.com/news/student-success/health-wellness/2023/12/11/five-factors-causing-food-insecurity-among-college.
13. Freudenberg N, Goldrick-Rab S, Poppendieck J. College student and SNAP: the new face of food insecurity in the United States. *Supplemental Nutr Assistance Program*. 2019;109 (12):1652–1669. doi:10.2105/AJPH.2019.305332.
14. Vespoli L. College food pantries have grown exponentially in recent years, an attempt to address rising food insecurity. What happened when campus is closed? The Counter https://thecounter.org/college-food-pantries-rising-food-insecurity-covid-19-coronavirus/ Accessed 27 March 2023. 2020.
15. Wood S How colleges are addressing food insecurity. U.S. News & World Report. Published March 16, 2022.
16. Metti T. Swipe out hunger acquires the college and university food bank alliance. Swipe Out Hunger. 2021.
17. Kihlstrom L, Long A, Himmelgreen D. Barriers and facilitators to the consumption of fresh produce among food pantry clients. *J Hunger Environ Nutr*. 2019;14(1–2):168–182. doi:10.1080/19320248.2018.1512923.
18. Conrad AG, Tolar-Peterson T, Gardner AJ, Wei T, Evans MW Jr. Addressing food insecurity: a qualitative study of undergraduate students' perceptions of food access resources. *Nutrients*. 2022;14(17):3517–3530. doi:10.3390/nu14173517.
19. Meza A, Altman E, Martinez A, Leung CW. "It's a feeling that one is not worth food": a qualitative study exploring the psychosocial experience and academic consequences of food insecurity among college students. *J Acad Nutr Diet*. 2019;119(10):1713–1721. doi:10.1016/j.jand.2018.09.006.
20. El Zein A, Matthews AE, House L, Shelnutt KP. Are hungry college students not seeking help? Predictors of and barriers to using an on-campus food pantry. *Nutrients*. 2018;10 (9):1163–1177. doi:10.3390/nu10091163.
21. Peterson N, Freidus A, Tereshenko D. Why college students don't access resources for food insecurity: stigma and perceptions of need. *Ann Anthropol Pract*. 2022;46 (2):140–154. doi:10.1111/napa.12190.
22. Ilieva RT, Ahmed T, Yan A. Hungry minds: investigating the food insecurity of minority community college students. *J Public Aff*. 2019;19(3):1891–1904. doi:10.1002/pa.1891.
23. Zigmont VA, Linsmeier AM, Gallup P. Understanding the why of college student food insecurity. *J Hunger Environ Nutr*. 2019;16(5):595–610. doi:10.1080/19320248.2019.1701600.
24. Southern Connecticut State University [SCSU]. Institutional research: demographics. *Inside Southern. Published*. n.d. [cited January 22, 2024]. Available from: https://inside.southernct.edu/ir/consumer-information/demographic.
25. Zigmont VA, Anziano J, Schwartz E, Gallup P. Captive market pricing and lack of transportation: a survey of undergraduate food insecurity at a public university in New England. *Am J Health Promot*. 2023;37(3):313–323. doi:10.1177/08901171221127006.
26. Hagedorn RL, Olfert MD. Food insecurity and behavioral characteristics for academic success in young adults attending an Appalachian university. *Nutrients*. 2018;10 (361):1–12. doi:10.3390/nu10030361.
27. Soldavini J, Berner M. The importance of precision: differences in characteristics associated with levels of food security among college students. *Public Health Nutr*. 2020;23(9):1473–1483. doi:10.1017/S1368980019004026.
28. USDA. Survey tools. USDA economic research service. October 17, 2022. [cited June 20, 2023]. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/survey-tools/#.

29. Blumberg SJ, Bialostosky K, Hamilton WL, Briefel RR. The effectiveness of a short form of the household food security scale. *Am J Public Health*. 1999;89(8):1231–1234. doi:10.2105/AJPH.89.8.1231.
30. StataCorp [computer software]. Version 14. College Station, TX: StataCorp LP; 2015.
31. Landry MJ, Heying E, Qamar Z, et al. Advancing college food security: priority research gaps. *Nutr Res Rev*. 2023;37(1):1–13. doi:10.1017/S0954422423000094.
32. Hagedorn-Hatfield RL, Hood LB, Hege A. A decade of college student hunger: what we know and where we need to go. *Front Public Health*. 2022;10:1–8. doi:10.3389/fpubh.2022.837724.
33. Knol LL, Robb CA, McKinley EM, Wood M. Very low food security status is related to lower cooking self-efficacy and less frequent food preparation behaviors among college students. *J Nutr Educ Behav*. 2019;51(3):357–364. doi:10.1016/j.jneb.2018.10.009.
34. Bandura A. Self-efficacy. In: Ramachaudran VS. editors. *Encyclopedia of Human Behavior. 4. Book Medium*. New York: Academic Press: 71–81. Accessed June 21, 2023. http://acmd615.pbworks.com/f/Self-efficacydefined.pdf.
35. Shi Y, Davies A, Allman-Farinelli M. The association between food insecurity and dietary outcomes in university students: a systematic review. *J Acad Nutr Diet*. 2021;121(12):2475–2500. doi:10.1016/j.jand.2021.07.015.
36. Anziano J, Zigmont VA. Understanding food insecurity among college athletes: A qualitative study at a public university in New England. Journal of Athletic Training. *J Athl Train*. 2023;58(1):1–30. doi:10.4085/1062-6050-0660.22.
37. Bruening M, Brennhofer S, van Woerden I, Todd M, Laska M. Factors related to the high rates of food insecurity among diverse, urban college freshmen. *J Acad Nutr Diet*. 2016;116(9):1450–1457. doi:10.1016/j.jand.2016.04.004.

APPENDIX A. Survey Instrument

(1) Do you consent to participate in this research study? Mark only one oval.
- Yes, I am 18 years of age or older and I consent to this survey. Skip to question
- No, I do not consent to complete this survey.

(2) Have you ever used any of the programs listed below? Check all that apply.
- Mobile Food Pantry
- Department of Public Health Food Pantry
- Psychology Food Events
- Peanut Butter and Jelly Program (sponsored by ProCon)
- Swipe it Forward Program – received meal(s)
- Swipe it Forward Program – donated meal(s)
- Other:

(3) How can we improve the programs you have used?

(4) What type of student are you? Mark only one oval.
- Undergraduate – Freshman
- Undergraduate – Sophomore
- Undergraduate – Junior
- Undergraduate – Senior
- Graduate Student
- Other:

(5) Where do you live? Mark only one oval.
- On Campus – Dorms (kitchen on my floor)
- On Campus – Apartment (my own kitchen)
- Off Campus – Apartment or house with a kitchen
- Other:

(6) In the last 12 months, was the following statement often true, sometimes true or never true for you: "The food I bought didn't last, and I didn't have money to get more" Mark only one oval.
- Often True
- Sometimes True
- Never True

(7) In the last 12 months, was the following statement often true, sometimes true or never true for you: "I couldn't afford to eat balanced meals" Mark only one oval.
- Often True
- Sometimes True
- Never True

(8) In the last 12 months did you ever cut the size of your meals or skip meals because there wasn't enough money for food? Mark only one oval.
- Yes, almost every month
- Yes, some months but not every month
- Yes, only 1 or 2 months
- No

(9) In the last 12 months were you ever hungry, but didn't eat, because there wasn't enough money for food? Mark only one oval.
- Yes
- No
- I don't know

(10) In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? Mark only one oval.
- Yes

- No
- Don't Know

(11) How would you rate your cooking ability? Mark only one oval.

I do not know how to cook	1 2 3 4 5 6 7 8 9 10	I know how to cook

(12) Do you have access to storage space for perishable cooking supplies? Mark only one oval.

- Yes – I have access to a community fridge
- Yes – I have a fridge in my dorm room or apartment
- Yes- I have a fridge at home in my apartment or house off campus
- No – I do not have access to refrigeration
- Other:

(13) Describe your access to transportation. Check all that apply.

- I drive my own car, or share one with a friend or family member
- I ride a bike or skateboard to get around
- I take the bus to get around
- I rely on friends or family to get where I need to go
- Other:

(14) Are you interested in a grocery pick-up program on campus? Mark only one oval.

- Yes, I am interested
- No, I am not interested

(15) If there was a grocery pick-up program, please tell us about your interest in the following: Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I would use the program to buy prepared snacks					
I would use the program to buy drinks					
I would use the program to buy ready to eat foods (cereal, milk, bread, vegetables and fruits)					
I would use the program to buy ingredients that I will plan to cook					
I would use the program to get recipes that involve using a stove to cook					
I would use the program to get recipes that involve using a microwave to cook					
I would like to take cooking classes to learn how to cook meals for myself					

(16) What quantity of food would you like to have delivered in a grocery bag? Check all that apply.

- Snacks for the week
- Drinks for the week
- Enough food to provide 2- 6 meals for the week
- Enough food to provide 7- 14 meals for the week
- Enough food to provide 15- 21 meals for the week
- Other:

(17) If you could pick-up your groceries one time per week, and the items you selected in the question above were included in your bag, how much would you be willing to spend on your groceries?

Thank you for completing this survey.