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Perceived Hunger in College Students Related to Academic and Athletic Performance

Amanda Hickey *, Dena Shields and Margaret Henning

Public Health Department, Keene State College, Keene, NH 03435, USA; dshields@keene.edu (D.S.); mhenning@keene.edu (M.H.)

* Correspondence: amanda.hickey@keene.edu; Tel.: +1-608-358-2868

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Abstract: The current study examines perceived hunger, which may result from food insecurity, and its effect on academic and athletic performance in students on a liberal arts college campus in New Hampshire. It also examines how students compensate for hunger and their preferences for different types of resources to address hunger. A review of the literature on food insecurity in college students informed the development of a questionnaire on hunger. A mixed-method approach was used to collect qualitative/quantitative data from students of different disciplines. Three hundred and seventy-one students had complete surveys. Thirty-six percent and 34% of students reported that their academic and/or athletic performance, respectively, had been affected by hunger. Forty-seven percent of students responded they would consider taking advantage of an on-campus food pantry. In an open-ended question, students reported concerns about the social stigma related to economic instability and utilizing a food pantry. Our research findings support many on-campus initiatives including the creation of a student-run on-campus food pantry, longer dining common hours, a Swipe It Forward program, and the creation of a task force to address food insecurity on campus and to work with college systems to develop opportunities to better serve students at the college.

Keywords: hunger; food insecurity; academic performance; athletic performance; college students

1. Introduction

Food insecurity is a social condition in which access to adequate food may be limited or uncertain at times during the year [1]. This issue is emerging as a new public health concern among college students. New evidence demonstrates that food insecurity in college students is higher than in US national households [2]. This is a concern, as food insecurity has consistently been linked to poorer physical (e.g., obesity and diabetes) and mental health outcomes (e.g., anxiety and depression) across the lifespan [3].

According to the Urban Institute's report on students and hunger, part of the reason for the growing rates of hunger is a reflection of changing student demographics and an increase in low-income students attending college [4]. Studies of specific institutions have demonstrated that extensive food insecurity exists among college students [5,6]. More specifically, data from a large study that surveyed 3765 students from 34 different colleges and universities throughout the United States found that nearly 50% of the student population may be food-insecure [7]. A national survey on college food insecurity found that 36% of respondents were food-insecure in the 30 days preceding the survey [8]. It has been suggested that the recent reports of high rates of food insecurity in college students may be due to the rising costs of education and the lack of adequate financial aid to cover these costs and also meet housing and food needs [9].

Food insecurity is concerning in college students as it not only could negatively affect the physical/mental health of students as previously mentioned, but also has been shown to negatively

impact academic outcomes. These outcomes include lower grade point averages (GPAs), lower class attendance, and higher-class withdrawal [10–12]. All of these variables may ultimately impact the retention rates [11]. Therefore, within higher education, food insecurity may be a measure that is important for administration, faculty, and staff and that could provide insight into student health/well-being and also academic outcomes. It is important to note that this is a newly recognized area of concern in higher education, and data and research on the subject have only been published since 2009 [2].

In the recent systematic review cited previously, consisting of eight studies that measured food insecurity among US students attending higher education institutions, the authors concluded that institutions in higher education need to examine this problem on their campuses and must take the necessary steps to address students' basic needs such as food [1]. Davidson and Morrell were the first to report on this issue in the northeast, specifically, on a university campus in New Hampshire [13]. They found that food insecurity was of concern for their students and was more likely an issue in first-generation students. This is an important point, as prior research indicates that food insecurity interventions and policy should consider the specific demographics of the university population and develop procedures tailored to the college student population. Our current study is part of the increased commitment and response to food insecurity on the part of the university to use evidence to drive interventions. The current study is the second investigation in New Hampshire that responds to the call for action by Davidson and Morrell [13]. It specifically examines hunger, which may result from food insecurity, on a liberal arts college campus in New Hampshire. In addition, this study's objectives were to examine: (1) If students perceived hunger as a variable that affects their academic and/or athletic performances, (2) The percentage of students who utilized different methods to compensate for their hunger, and (3) The percentage of students who preferred different types of resources (on and off campus) that could address hunger. We hypothesized that (1) the majority of students would agree that hunger had affected their academic and/or athletic performances, (2) the method with the highest prevalence of utilization for compensating for hunger would be buying cheap food because of price, and (3) students would prefer on-campus rather than off-campus resources to address hunger. Lastly, the data gathered were used to inform policy changes and initiatives on campus to address the issue of hunger, which will be described in the discussion section.

2. Materials and Methods

2.1. Study Design and Participant Recruitment

A cross-sectional study was conducted in the Spring of 2018 on a liberal arts college campus in New Hampshire. A mixed-method approach was utilized to collect data and allow for the triangulation of the results [14]. All tools were reviewed and approved by the Keene State College Institutional Review Board (IRB). Two student researchers worked as part of the research team as research assistants. One student was from the Public Health department, and one from the Biology Department, and both students completed ethical training prior to data collection. First, the research assistants e-mailed professors across campus to request permission to visit classes to administer the survey regarding hunger to students. After receiving approval from professors, the research assistants visited each approved classroom and provided students a link to the electronic survey. The survey was filled out while the research assistants were the in the classroom and could answer questions, and the research assistants stayed until all students completed the survey. No student was excluded from taking the survey, and each student was asked to complete the survey only one time. There were no instances where the survey was filled out in a non-face-to-face manner. The in-person rather than e-mailing link was opted to minimize survey burden, as students on campus receive many e-mailed surveys throughout the semester. The research assistants who attended the classes were able to define food insecurity and describe the importance of this research question and how their input was valuable and could help create change on campus. We were able to obtain responses from students in 28 different

disciplines across campus. A total of 380 students attempted the survey, and 371 students completed the survey in Spring of the 2018 semester. The final sample represented approximately 10% of the total undergraduate population at the college. Table 1 presents student demographics of the sample surveyed for this study.

Table 1. Student Demographics.

Year	
First year	32.81%
Sophomore	28.08%
Junior	18.90%
Senior	19.42%
Other	0.79%
Gender	
Male	33.88%
Female	65.84%
Self-described	0.28%
Received Finical Aid	
Yes	76.38%
No	23.62%
Age (in years)	
18	18.09%
19	28.09%
20	23.31%
21	17.98%
22	10.11%
>22	4.49%
1st Generation College Student	
Yes	24.93%
No	75.05%
Meal Plan	
Yes	80.84%
No	19.16%
Race	
American Indian/Alaskan Native	0.28%
Asian	1.38%
Black/African American	1.38%
Hispanic	2.20%
Native Hawaiian/Pacific Islander	0.28%
White	89.81%
2 or more races	5.00%
Student Athlete	
Yes	78.17%
No	21.83%

This table reports the percentage of students that fell within each demographic.

2.2. Hunger Survey

A survey was developed by faculty in the Public Health Department at the college and informed by a literature review. Prior literature focused on the prevalence of food insecurity among college students, whereas this study's main purpose was to determine if students perceived their hunger to affect their academics (i.e., attending class, grade point average) and, if they were athletes, if hunger affected their athletic performance (i.e., ability to perform, missing practices). The survey specifically contained questions about demographics (age, gender, year of undergraduate study, participation in campus meal plan, financial aid status, and grade point average). Questions about experiences prior to college with hunger, nutrition programs, and food assistance were included in the survey. There were questions regarding hunger during the academic year including about how it affects academics and whether the food runs out or causes students to miss class. If the students indicated they were athletes, they received survey questions about how hunger had affected their athlete performance in particular. In addition, the survey questioned students regarding their awareness of different resources [Supplemental Nutrition Assistance Program (SNAP), local community kitchens], which type of resource they would rather use, and whether there was stigma associated with any of these resources. Since this survey was developed specifically for this research project, we do not have reliability or validity data as it has not been tested repeatedly or against a criterion measure. However, the survey had face validity, as the content and wording directly related to key aspects of campus hunger. The survey was reviewed by assessment experts on campus prior to administration.

2.3. Statistical Analyses

All survey responses were collected using *Qualtrics* software (Qualtrics XM). Results were analyzed via *Qualtrics* or exported to *Excel* for analysis. To determine the proportion of students whose academics were affected by hunger, the following survey question was utilized, "Has hunger caused you not to perform as well in a class as you otherwise could have?" Responses were reported from strongly disagree to strongly agree, on a five-point scale. We considered students who responded "somewhat or strongly agreed" as self-reporting that hunger affected their academic performance. To determine the proportion of students whose athletic performance was affected by hunger, the following survey question was utilized, "Has hunger affected your ability to participate in practice or games or perform as well as an athlete?" Similar to academic performance, we considered students who responded "somewhat or strongly agreed" as self-reporting that hunger had affected their athletic performance. *T*-tests were used to examine if there were differences in GPA between those who self-reported hunger and those who did not. Significance was set at $p < 0.05$. Descriptive statistics were used to describe the proportion of students who were utilizing different methods to compensate for food/funds on a daily basis and/or at least once a week. Additionally, descriptive statistics were used to describe the proportion of students who would possibly use, likely use, or definitely use different types of on- and off-campus resources to address hunger.

3. Results

3.1. Self-Assessed Hunger Effects on Academic and Athletic Performance

The results indicate that students perceived that hunger affected their ability to perform academically and athletically. When asked the survey question "Has hunger caused you not to perform as well in a class as you otherwise could have?", 36.4% of students somewhat or strongly agreed. Thirty-six percent of students with meal plans and 37% percent without meal plans also indicated they somewhat or strongly agreed with this question. Furthermore, 39% of first-year students, on required, unlimited meal plans, responded that they somewhat or strongly agreed that hunger affected their academic performance. Using a more objective measure of academic performance (GPA), the students who self-reported hunger had lower GPAs than those that did not self-report hunger (*t*-test, $p = 0.008$). Students were asked to self-report their GPAs. Of those that reported hunger,

the majority of students, 36%, had a GPA between 2.6 and 3.0, whereas, of those that did not report hunger, 41% had GPAs between 3.0 and 3.5. In addition, there was a higher percentage over 3.5 and a lower percentage below 2.5 in the non-hungry category. First-semester students' data were not included if GPA was not yet available. These data are presented in Figure 1. When specifically asking athletes about their hunger, it was found that 34.6% of athletes reported that hunger affected their performance during games or practice. There was a moderate relationship (correlation coefficient of 0.69) between the question asking if hunger causes students not to perform as well in classes as they could and the question asking if hunger affected their ability to participate in practice or games or perform as well as an athlete. No correlation was found between perceived hunger, performance, and gender or race/ethnicity. Student demographics in survey participation closely reflected Keene State demographics related to race/ethnicity [15]. Though 76.8% of students that responded to the survey received financial aid, there was not a strong enough correlation to clearly demonstrate a relationship between economic status, hunger, and performance.

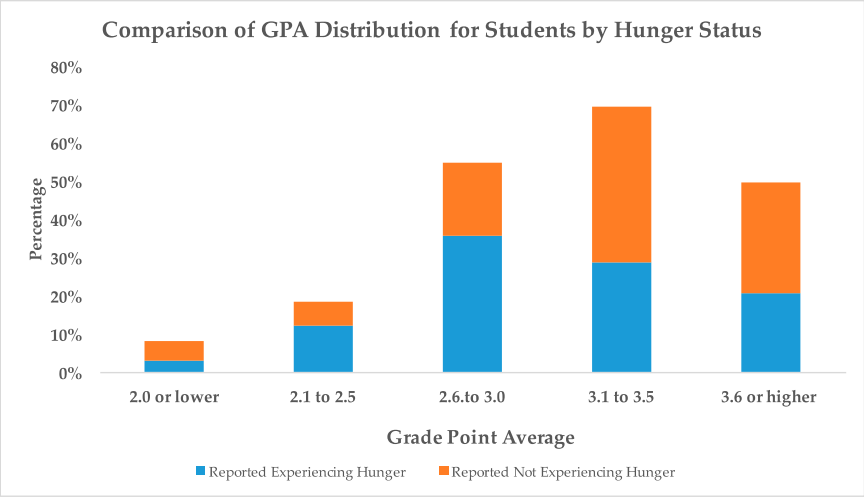

Figure 1. Comparison of grade point average (GPA) distribution for students based on self-assessment of hungry versus not hungry. This figure compares average GPAs of those who reported they were hungry (**blue**) and those who self-reported they were not hungry (**orange**).

3.2. *Methods Students Utilized to Compensate for Lack of Food or Funds*

The survey data showed that 48.5% of students' food ran out before they had money to buy more. On a daily or weekly frequency, students compensated for lack of food or funds for food in numerous ways, which are described below in Table 2. The method with the highest prevalence of utilization on both a daily basis and at least once a week was buying cheap food despite it being unhealthy or disliked.

Table 2. Methods students utilized to deal with hunger.

Student Behavior	Percent of Students Utilizing Behavior Daily	Percent of Students Utilizing Behavior At Least Once a Week
bought cheap food because of convenient price despite it being unhealthy or disliked	6.1%	29.3%
hide the fact of inadequate food from family, friends, classmates	1.7%	4.0%
ask family and friends for food or money for food	1.4%	9.5%
students skip or cut the size of meals often or sometimes, due to inadequate funds	1.6%	12.1%

This table reports on the percentage of students that utilized different methods for compensating for lack of food or funds. The first column presents the percentage of students that utilized that particular method on a daily basis, and the second column presents the percentage of students that utilized that particular method at least once a week.

3.3. Student Preferences of Using Different Types of Resources to Address Hunger

When students were asked regarding willingness to utilize resources, they were more likely to opt for on-campus resources (Table 3). A higher percentage of students reported that they would possibly use, likely use, or definitely use on-campus resources over SNAP, hot meals at local community meal programs, or off-campus food pantries.

Table 3. Student preference for using different community/campus resources to address hunger. SNAP: supplemental nutrition assistance program.

Resource	% Students Possibly Use	% Students Likely to Use	% Students Definitely Would Use
On-campus resource (food pantry, swipe-share program)	30.0%	10.6%	6.1%
SNAP (food stamps)	13.0%	3.0%	2.8%
hot meal at local community meal program (in town)	9.7%	3.9%	3.0%
food pantry in town	17.8%	5.6%	3.6%

This table reports student preferences for using different community and campus resources to address hunger. The first column reports the percentage of students that would possibly use that specific resource, the second column reports the percentage of students likely to use that resource, and the third column reports the percentage of students that would definitely use that resource.

Lastly, the results clearly demonstrate a theme when students were asked the following open-ended question: "Do you have any feelings about using a community kitchen or food pantries?" There were 210 students that provided answers to this question. One hundred students reported they supported community kitchens and food pantries. Twelve students described that they felt that there is a social stigma associated with the use of food pantries, and, despite experiencing hunger that was affecting their performance, 41 students reported they felt that others needed resources more than themselves.

4. Discussion

On a college campus, hunger is an issue affecting academic and athletic performance, as reported also by other studies that have focused on food insecurity rather than hunger [10,11]. In studies that have examined food insecurity, academic performance is often measured via GPA. In a study conducted in college students attending an Appalachian University, it was found that students who reported being food-insecure had lower academic progress scores and lower GPAs [16]. This is similar to our finding that students who reported hunger had lower GPAs than those who did not. Our work also suggests that hunger may impact students' abilities to engage fully in the academic experience (i.e., missing out on extracurricular). In a review of overall diet and academic achievement in college students, it was found in five of the seven studies, that breakfast, regular meal consumption, and meeting national recommendations for fruit intake were behaviors positively related to academic achievement [17]. It is possible that those in our study reporting that hunger affects their academics may not be participating in those behaviors. Future work should examine how hunger and food insecurity are specifically impacting a comprehensive measure of college students' diets.

Interestingly, in our study, first-year students had the highest rate of self-reported hunger and a decrease in academic performance, yet the institution where these data were collected requires first-year students to purchase an unlimited meal plan. This is not unusual and is consistent with prior research related to first-year students and unused meals [18]. The results for students of self-reported hunger related to academic performance suggests a need for further research into how required meal plans affect hunger and the social experience of first-year students. Mental health may also affect the social experience of these students. In a study published in 2016 by Bruenig et al., it was found that the

rates of depression and anxiety were three times as high in food-insecure college freshmen at a diverse urban college [19].

Similar to academic performance, we examined if the students who reported they were athletes reported that hunger affected their athletic performance. While eating disorders have been shown in the literature to negatively affect athletic performance and participation [20], our work demonstrates that hunger should also be considered. There is a lack of peer-reviewed research related to athletes and food security in higher education. Results from this work suggest the need to further investigate athletes in particular and the support/education they receive around food and nutrition.

In addition to the aforementioned future research ideas, future work should improve upon the limitations of the current study. First, the study only included one college campus from the northeast, and the sample was primarily composed of Caucasians, had a large percentage of athletes, females were overrepresented, and a large percentage of students were receiving financial aid. According to Mukigi and Brown and their review of eight prior studies regarding food insecurity in college students, females are consistently overrepresented [21]. In terms of the large percentage of students receiving financial aid (76%), our population may have a higher proportion of students who are food-insecure than other universities where fewer students are receiving financial aid. Therefore, future studies should include multiple universities with more diverse demographics. Another limitation is that we developed the described survey specifically to examine self-perceived hunger, academic performance, and athletic performance. Therefore, we do not have reliability and validity data. A last limitation is that we have also learned that students utilize different methods to cope with hunger; however, we failed to ask or further clarify the impact of these coping mechanisms on physical and emotional health. Future research should examine the physical and emotional consequences in college students when they have to cope with hunger.

This research provides empirical evidence to support a number of initiatives on campus. The purpose of developing these initiatives is to provide support to students so that it is not necessary for them to implement some of the other coping strategies and, in the long run, to positively affect students' academic, career, and life success. In the literature, other studies report similar coping strategies for dealing with food insecurity as we found for dealing with hunger. These include choosing cheaper, less nutritious foods and skipping meals [9,16,22,23]. These coping strategies are of concern, as previous research demonstrates they are related to poor academic success [16,22,23].

In terms of types of resources to deal with hunger, our survey results indicated that students were more likely to utilize on-campus resources; therefore, an on-site food pantry was initiated with consideration for the social stigma. To respond, satellite spaces have been created throughout the campus to ensure multiple points where students can access food, including the gym, library, and academic spaces, with much success. This strategy is supported by research completed by Zein et al. in which barriers to on-campus food pantries were found to be social stigma, lack of information regarding pantry policies, inability of students to self-identify, and inconvenient pantry hours [24]. Satellite pantries have created a system that has eliminated a need to "check in" and does not require students to understand any policy but to "help themselves" at any time of day or evening when the buildings are open. Our future work aims to measure social stigma; however, there subjectively appears to be an acceptance in the use of these satellite pantries, as students, staff, and faculty can be seen using these resources, and food is being utilized as expected. Our survey reported that only 2.8% were likely to use SNAP benefits as a resource for hunger. In addition to the potential stigma of receiving these benefits, it is possible that the students were unaware they were eligible to receive them. In a 2018 report from Young Invincibles, it was stated that 50% of students are struggling with food insecurity, 18% of students are eligible for SNAP, but only 3% of students receive benefits [25]. We plan on providing a way for our students to receive federal agency information and assistance with access to these benefits. Our plans include the creation of a resource room that students may visit for support in filling out SNAP and other federal assistance program applications.

A "Swipe It Forward" meal-share program will also be initiated in fall 2019, which would allow students who are on a meal plan to donate their guest swipes to other students struggling with hunger by providing free meals in the dining hall for students in need. Meal-share programs have been initiated at other institutions. However, there is a lack of peer-reviewed journal articles on proof of success in their use to address food insecurity to date. There is a national nonprofit called "Swipe Out Hunger", and their website reports that "52% of students who we serve agree swipes improved their grades" and "After receiving meal swipes, 1/2 of students no longer worry food will run out" [22,26]. The Share Meals App is another example of a meal-sharing initiative that was created by a New York University graduate student in 2013 [27]. Using this app, students can find meal swipes in real time and find events with free food. This last feature is important, as studies have shown students attend events on or near campus to get free food as a coping mechanism for food insecurity [9].

As a result of this current research, a Hunger and Homelessness Task Force for the college was created as a collaborative group of students, staff, faculty, and community members working together to help students with food insecurity/issues related to hunger and homelessness. As a result of the student survey feedback, some operational decisions were impacted. For example, afternoon dining hall lunch hours were increased by two hours, and evening grab-and-go station hours were increased by two hours with an increase in healthy options. Going forward, there is an opportunity to consider the best practices for access for students with and without meal plans and the sustainability of this effort and to ensure students have access to a range of healthy food options. In conclusion, it is important to open the dialogue regarding hunger and college students, to continue to conduct research in this area, and to work together to combat these issues.

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