

The Role of Food Security as a Social Determinant of Mental Health in College Students

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Abstract

Objective: This study examined the prevalence of food insecurity and its association with anxiety and depression among students at Delaware State University (DSU). **Methods:** A cross-sectional survey was administered to 117 students via classroom distribution, social media, campus events, and within the campus food pantry. Food insecurity was assessed using the USDA Six-Item Short Form, anxiety levels were determined using the GAD-7 survey tool, and depression scored with the PHQ-9 survey tool. Descriptive statistics were used to describe the population and the chi square test to analyze relationships between food security status and mental health outcomes. **Results:** Among respondents ($n = 117$), 97% were classified as food insecure ($n = 113$), and of those, 17% ($n = 20$) reported moderate-to-severe anxiety and 32% ($n = 37$) reporting moderate-to-severe depression. Only 37% ($n = 43$) of the students surveyed ($n = 117$) accessed mental health services within the past year and only 6% ($n = 7$) participated in food assistance programs. Although notable proportions of students experiencing food insecurity presented with elevated mental health symptoms, there was no statistically significant association between food security status and levels of depression or anxiety. **Conclusions:** The lack of statistical significance does not rule out a meaningful relationship between food and psychological distress. Larger sample sizes, longitudinal studies, and the inclusion of impacting variables such as financial supports are warranted to get an accurate assessment of our current student needs. Developing targeted interventions addressing both nutrition and mental health are essential to improve student well-being at a critical “gateway” period—habits and health challenges that emerge in this life stage often influence lifelong health trajectories.

Introduction

Food Insecurity as a Social Determinant of Health

Food security is widely recognized as a critical social determinant of health (SDOH), as it not only shapes individuals’ access to adequate nutrition but also directly influences their capacity to maintain both physical and mental well-being.¹ Food insecurity, defined as a deficiency in the quantity or quality of food, constitutes a critical nutritional risk that disrupts dietary adequacy and quality, contributing to various forms of malnutrition, including undernutrition as well as overnutrition, as evidenced by overweight and obesity.² According to the U.S. Department of Agriculture, 13.5% of the U.S. population experienced food insecurity, representing a statistically significant increase from 2022.³ Among college students, food insecurity has emerged as a growing public health concern, with increasing evidence suggesting that limited or unstable access to food is associated with heightened levels of stress, anxiety, and depressive symptoms.^{4,5} As this population navigates academic pressures, financial strain, and transitional life stages, understanding the intersection between food security status and mental health outcomes becomes vital for developing effective campus-based interventions and support

systems. This study examines food insecurity and its association with psychological distress, including symptoms of anxiety and depression within young adults at a minority-serving institution.

Food Insecurity Prevalence and Mental Health Implications

Food insecurity has been widely documented as a determinant of poorer mental health outcomes, with associations observed across diverse global regions regardless of socioeconomic status.⁴ Beyond its direct impact on nutrition, food insecurity functions as a chronic stressor, exacerbating psychosocial strain and increasing vulnerability to depression, anxiety, and other common mental disorders.^{4,5} These effects are not solely explained by food deprivation; they also operate through multiple pathways, including the psychological burden of uncertainty, diminished perceived self-efficacy, and cultural expectations related to food provision and family care.⁴ Jones conducted a comprehensive global analysis examining the relationship between food insecurity and mental health using cross-sectional data from individuals in 149 countries.⁴ The study revealed a clear dose-response relationship, demonstrating that as food insecurity increased in severity—from mild to moderate to severe—mental health outcomes correspondingly declined.⁴ These findings underscore the pervasive impact of food insecurity on psychological well-being across diverse cultural and socioeconomic contexts, highlighting the importance of addressing food insecurity not only as a nutritional concern but also as a critical determinant of mental health. Understanding this relationship is essential for informing public health policies and interventions aimed at mitigating both food insecurity and its associated mental health burdens.

Food Insecurity and Mental Health Related to Young Adults

Research has also increasingly explored the relationship between food insecurity and psychological distress in younger populations, including young adults.^{5,6} These investigations have employed both primary data collection and secondary data analyses across countries. Using data from the U.S. National Health and Nutrition Examination Survey (NHANES), Maynard et al. examined the association between food insecurity and perceived anxiety among adolescents aged 12 to 17 years.⁵ Maynard's findings suggest that the relationship between food insecurity and mental health may be bidirectional, with food insecurity both contributing to and being exacerbated by psychological distress.⁵ The experience of food insecurity is inherently tied to ongoing worry and anxiety about meeting basic nutritional needs, which can induce a persistent state of psychological strain.⁵ The concept of toxic stress—defined as chronic, unmitigated stress in the absence of adequate social or structural support—offers a relevant explanatory framework for understanding how repeated or prolonged episodes of food insecurity may erode mental well-being.⁵ Meza et al. conducted in-depth, semi-structured interviews with undergraduate students to investigate the psychosocial impacts of food insecurity.⁶ They identified multiple psychosocial themes emerging from students' lived experiences with food insecurity, including the constant stress of securing food interfering with daily functioning, fear of disappointing family expectations, and feelings of resentment toward peers with greater financial stability.⁶ Participants also described difficulty forming meaningful social connections due to food-related shame, alongside emotional responses such as sadness, hopelessness, and feeling undeserving of assistance.⁶ Additionally, there was a notable sense of frustration directed toward academic institutions for their perceived lack of structural support and acknowledgment of student food insecurity.⁶

Nutritional Pathways and Mental Health Outcomes

One male student in Meza's study specifically noted the stress associated with consuming "trans-fat and unhealthy food" due to financial limitations, which adversely affected his physical health and further exacerbated his anxiety.⁶ Food insecurity among college students has been consistently linked to both nutritional and mental health challenges.⁵⁻⁸ Students experiencing food insecurity often report lower dietary quality, including reduced intake of fruits, vegetables, and fiber, and higher consumption of added sugars, which can compromise physical health.^{7,8}

Inadequate fiber intake may contribute to negative mental health outcomes, as fiber-rich fruits and vegetables have been associated with reductions in stress, depression, and mood disturbances, as well as improvements in overall quality of life.⁸ Beyond nutritional consequences, food insecurity is also associated with increased psychosocial stress, manifesting as poor sleep quality, anxiety, and depression.⁸ These findings highlight the multifaceted consequences of limited food access, illustrating that inadequate food security not only affects dietary intake but also contributes to substantial behavioral and mental health outcomes.^{6,8}

Additionally, the gut microbiome represents an important and increasingly explored biological pathway through which food insecurity may influence mental health, as disruptions in dietary quality can alter gut-brain signaling mechanisms associated with anxiety and emotional regulation.⁹ Emerging evidence from nutritional neuroscience indicates that inadequate or poor-quality food intake does not only affect physical health but also disrupts critical brain processes involved in mood regulation and stress response.⁹ Given that the brain consumes approximately 20–25% of the body's total energy and depends on consistent nutrient availability to support neurotransmitter production, neuroplasticity, and gut-brain communication, food insecurity can disrupt these pathways and contribute to heightened anxiety symptoms.⁹

Understanding these relationships is critical for the development of comprehensive interventions that address both the nutritional and psychological needs of food-insecure student populations.

Gap in Literature

A key gap in knowledge lies in the limited understanding of how food insecurity specifically affects the mental health—particularly anxiety and depression levels—of college students, a population experiencing a unique developmental and life transition. While food insecurity has been widely studied in general adult populations and low-income households, much less is known about how it manifests in young adults pursuing higher education, who are often perceived as relatively privileged compared to other at-risk groups.

College students face distinct stressors such as academic pressure, unstable employment, limited financial independence, and social expectations, which may intensify the psychological impact of food insecurity. However, current research often fails to differentiate their experiences from broader adult populations or to examine anxiety and depression as distinct outcomes rather than grouping them under general psychological distress.

Additionally, food-insecure college students may not qualify for traditional safety net programs, leaving a gap in both support and surveillance. This makes it difficult for institutions to design effective interventions without first understanding how food insecurity contributes to anxiety and depression in this demographic. Therefore, exploring these specific relationships are essential for developing targeted campus-based strategies that address not only hunger but also the associated

emotional and psychological burdens that may hinder academic performance, retention, and overall well-being.

Methods

This study employed a quantitative, cross-sectional research design. Surveys ($n = 117$) were distributed through multiple channels, including in-class administration, social media, campus events, and participation in the campus food pantry at Delaware State University (DSU), representing approximately 2.5% of the total student population ($N = 4,581$).⁸ DSU is a Historically Black College and University (HBCU) located in Dover, Delaware, with an enrollment composed of 76% African American students.¹⁰ Data was collected over a six month period from January to June of 2025.

Measures

Ethical procedures for the collection of student data included approval from the Institutional Review Board – Human Subjects Protection Committee. An exemption was granted under Category 3, and all information was recorded in a manner that prevented the identification of individual participants, either directly or through linked identifiers. Data were collected using validated survey instruments. Food insecurity was assessed with the U.S. Household Food Security Survey Module: Six-Item Short Form (USDA), multiple responses were coded as binary with affirmative responses collapsed to determine overall food insecurity levels, scores 2 and over labeled as food insecure.¹¹ Affirmative responses included “often” or “sometimes” for questions HH3 and HH4, and “yes” for questions AD1, AD2, and AD3.¹¹ Responses of “almost every month” or “some months but not every month” on AD1a were also coded as affirmative.¹¹ The sum of affirmative responses across the six questions constituted each survey respondent’s raw score. Food security status was then assigned as follows:

- **0–1:** High or marginal food security (raw score 1 may be considered marginal).
- **2–4:** Low food security
- **5–6:** Very low food security

For reporting purposes, raw scores of 0–1 were categorized as food secure, while the combined categories of low and very low food security were considered food insecure.¹¹

Anxiety was measured using the Generalized Anxiety Disorder 7-item scale (GAD-7), the instrument was scored through the tally of the numbers of all checked responses under each heading (not at all=0, several days=1, more than half the days=2, and nearly every day=3) a score of 10 or more indicated a preliminary diagnosis of Generalized Anxiety Disorder (GAD).¹² Depression was assessed with the Patient Health Questionnaire 9-item scale (PHQ-9), the instrument was scored through the tally of the numbers of all checked responses under each heading (not at all=0, several days=1, more than half the days=2, and nearly every day=3) scores of 10 and higher indicated a preliminary diagnosis of moderate to severe depressive symptoms.¹³ Surveys were administered via the online platform Anthology with a total of $n = 117$ students through in-class sessions, campus events, social media campaigns, and participation in the campus food pantry.

Data Analysis

Descriptive statistics were used to summarize food insecurity, anxiety (GAD-7), and depression (PHQ-9) scores. Data were analyzed in Excel using counts and percentages for survey responses. Food security status was then assigned through the sum of affirmative responses across the six questions which constituted each student's raw score. For the GAD-7 and PHQ-9 measures, responses were scored using standard procedures. Each item was coded as follows: "Several days" = 1, "More than half the days" = 2, and "Nearly every day" = 3. Total scores were obtained by summing item responses, and results were interpreted using the corresponding scoring guidelines for each scale.^{12,13} The chi square test was used to provide insight to the relationship between food insecurity and anxiety levels of students as well as food insecurity and depressant levels of the students surveyed. Students received their individual results along with contact information for campus counseling services and the campus food pantries.

Additionally, counts of demographic characteristics, including gender, race, class standing, living arrangement, meal plan participation, food assistance and mental health utilization were calculated. This descriptive analysis identified patterns and trends within the data, providing a more comprehensive understanding of the study population.

Results

A total of $n = 117$ students completed the survey. The majority of respondents identified as black, indigenous and people of color (BIPOC) (95%, $n = 111$) and female (92%, $n = 108$), with 8% identifying as male ($n = 9$). Most participants were upperclassmen, including 43% juniors ($n = 50$) and 46% seniors ($n = 54$). Regarding employment, 23% of students reported working full-time ($n = 27$), while 56% worked more than 20 hours per week ($n = 65$).

Living arrangements indicated that 58% of students resided on campus ($n = 68$), whereas 37% lived off-campus with roommates, parents, or a spouse ($n = 43$). Meal plan participation varied: 22% of students had a plan with 19 meals per week and \$200 in Flex dollars ($n = 26$), 15% received 125 block meals with \$150 Flex dollars ($n = 17$), and 9% had 200 block meals with \$225 Flex dollars ($n = 11$). Nearly half of respondents (47%, $n = 55$) did not have a meal plan.

Most students reported not participating in food assistance programs (86%, $n = 110$), which included SNAP, emergency food from churches, food pantries, food banks, emergency kitchens, or private organizations. Only 6% ($n = 7$) reported using any of the aforementioned food assistance programs. Regarding food security, 94% of students were classified as having low food security ($n = 110$), with an additional 3% experiencing very low food security ($n = 3$). Characteristics of the sample regarding responses discussed: food insecurity, GAD-7, and PHQ-9 can be found in Table 1.

Among students with low or very low food security, 17% exhibited moderate-to-severe anxiety ($n = 20$) and 32% exhibited moderate-to-severe depression ($n = 37$). While 1.7% ($n = 2$) of food secure students ($n = 7$) exhibited moderate-to-severe anxiety and moderate-to-severe depression levels. Despite these findings, only 33% of students ($n = 39$) reported participating in any mental health services within the past year and 6% ($n = 7$) utilized food assistance programs over the past year. The Chi-Square test ($p < .05$) indicated no statistically significant association between food security status and levels of anxiety ($p = 0.596$); in addition, no statistical significant association was found between food security status and levels of depression ($p = .0865$). The

relationship of the food security and food insecurity variables as related to anxiety (GAD-7), and depression (PHQ-9) can be found in Table 2 and Table 3 respectively.

Table 1. Population Characteristics of the Sample

| Characteristics | Number | % |
|-------------------------------------|--------|-----|
| Gender | | |
| Male | 6 | 5 |
| Female | 108 | 92 |
| Other | 3 | 3 |
| Race/Ethnicity | | |
| BIPOC | 95 | 111 |
| White | 5 | 6 |
| Student Class | | |
| Freshman | 1 | 1 |
| Sophomore | 11 | 9 |
| Junior | 50 | 43 |
| Senior | 54 | 46 |
| Other | 1 | 1 |
| Living Arrangements | | |
| On Campus | 68 | 58 |
| Off Campus (w/others) | 43 | 37 |
| Other | 6 | 5 |
| Meal Plan | | |
| 19 meals + \$200 Flex | 26 | 22 |
| 125 block + \$150 Flex | 17 | 15 |
| 200 block + \$225 Flex | 11 | 9 |
| No Meal Plan | 55 | 47 |
| Other | 8 | 7 |
| Food Assistance | | |
| Yes | 7 | 6 |
| No | 110 | 94 |
| Food Security | | |
| Adequate | 4 | 3 |
| Low | 110 | 94 |
| Very Low | 3 | 3 |
| Mental Health Service Access | | |
| Yes | 43 | 37 |
| No | | |

Table 2: DSU Food Insecurity and Anxiety Levels (GAD-7)

| | DSU (<i>n</i> = 117) | Chi-square Significance (<i>p</i> < .05) |
|-------------------------------------|-----------------------|---|
| Food secure students with anxiety | <i>n</i> = 2 (1.7%) | 0.596 |
| Food insecure students with anxiety | <i>n</i> = 20 (17%) | |

Table 3: DSU Food Insecurity and Depression Levels (PHQ-9)

| | DSU (<i>n</i> = 117) | Chi-square Significance (<i>p</i> < .05) |
|--|-----------------------|---|
| Food secure students with depression | <i>n</i> = 2 (1.7%) | 0.865 |
| Food insecure students with depression | <i>n</i> = 37 (32%) | |

Discussion

In a sample of 117 students, 17% (*n* = 20) reported moderate to severe anxiety and 32% of those identified as food insecure reported moderate to severe depression (*n* = 37). Although notable proportions of students experiencing food insecurity presented with elevated mental health symptoms, the chi-square test indicated no statistically significant association between food security status and levels of anxiety or depression. This suggests that while the trend is clinically relevant, food insecurity alone may not be a strong independent predictor of moderate to severe mental health symptoms in this sample, or the sample size may lack sufficient power to detect significance. The lack of statistical significance does not rule out a meaningful relationship but may reflect limitations such as sample size, distribution imbalance, or unmeasured confounding variables (e.g., social support, financial aid, living situation). Given that over one-third of food insecure students reported high depression levels, this still represents a public health concern warranting intervention, regardless of statistical significance.

This study highlights the high prevalence of food insecurity among college students at Delaware State University, with 94% (*n* = 110) experiencing low food security and 3% experiencing very low food security (*n* = 3). These rates exceed national average of 13.5%, which may be reflective of a disproportionate burden of food insecurity in student populations at Historically Black Colleges and Universities (HBCUs).² Racial disparities within food access report that black, non-Hispanic households levels of food insecurity was almost double the national average at 23.3%.³ These factors could also mirror the complex interplay between academic demands, financial constraints, and limited access to nutritious food. Despite a higher prevalence of anxiety and depression in those surveyed, only 33% of these students accessed mental health services in the past year, underscoring a critical need for exploring enhanced supports. These findings emphasize the necessity of comprehensive interventions addressing both nutritional and psychological needs. Campus strategies, such as expanding food pantry access, meal plan support, and nutrition education, coupled with improved availability and connection to mental health services, may mitigate the negative consequences of food insecurity. Future research should explore larger population studies and longitudinal associations with the role of other social determinants of health to help guide policies and interventions promoting student well-being.

Public Health Implications

The findings of this study underscore the urgent need for additional research as well as targeted public health interventions addressing both food insecurity and mental health among college students. High prevalence of food insecurity, coupled with significant rates of anxiety and depression, highlights a dual burden that threatens academic success, physical well-being, and overall quality of life. Campus-level strategies can improve food security and dietary quality. Simultaneously, increasing awareness and accessibility of mental health services—including counseling, stress management workshops, and peer support programs—is critical to mitigate the

psychological consequences of food insecurity. Policies and programs that integrate nutritional support with mental health interventions can provide a holistic approach, addressing both immediate needs and long-term student well-being. Furthermore, these findings can inform broader public health planning to reduce disparities in food access and mental health outcomes in higher education populations.

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