THE PREDICTIVE RELATIONSHIP BETWEEN STUDENT FOOD-INSECURITY AND BASIC PSYCHOLOGICAL NEEDS WITHIN COLLEGE STUDENTS

by

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Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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ABSTRACT

In recent years, researchers have determined food insecurity affects a college student's grade point average (GPA), mental health, campus status, and social life. While each of these findings is valuable for post-secondary faculty and their decision-making, none can determine whether a student's basic psychological needs are affected by their food insecurity (FI), which is paramount in a student's success inside and outside of the classroom. Therefore, the purpose of this study was to determine whether there was a predictive relationship between the severity of a student's food insecurity and their basic psychological needs satisfaction. To accomplish the study, one hundred and ninety-three students from one community college, one private university, and one public university in the State of Florida were surveyed. These students completed the Food Insecurity Experience Scale as well as the Basic Psychological Needs Frustration and Satisfaction Scale (BPNSFS) to determine each participant's current satisfaction with Basic Psychological Needs (BPNs). By utilizing IBM's SPSS software and performing three bivariate regression analyses, the predictive relationship between food insecurity and BPN satisfaction was determined to be insignificant ($p < 0.05$). The results call for further quantitative research on this topic as BPNs frustration may be a confounding variable. Conversely, if BPNs frustration is not a confounding variable and confirms the study's results, it would be prudent to explore additional areas where FI affects college students. Therefore, it would be shrewd for future researchers to conduct mixed methods studies that include interviews in congruence with surveys.

Keywords: food-insecurity, BPNs, autonomy, competency, relatedness, and severity

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List of Abbreviations

Basic Psychological Needs (BPN)

Basic Psychological Need and Frustration Scales (BPNSFS)

Community College Success Measure (CCSM)

Food and Agricultural Organization of the United Nations (FAO)

Food Insecurity (FI)

Food Insecurity Experience Scale (FIES)

Grade Point Average (GPA)

Institutional Review Board (IRB)

Self-determination Theory (SDT)

Teaching Transformative Experience in Science model (TTES)

CHAPTER ONE INTRODUCTION

Overview

In the United States, 87.5% of college students who come from a low socioeconomic background are faced with food insecurity and hunger as they strive to do well in their classes. Sadly, these challenges greatly hinder their ability to perform well in a classroom setting, and consequently, they fall behind (Silva et al., 2015). Therefore, universities need to better understand how food insecurity affects student achievement, academic proficiency, and basic psychological needs (BPN) as they strive to help students from low socioeconomic upbringings succeed in higher education (Silva et al., 2015). In this study, the author will examine whether there is a predictive relationship between U.S. student BPN and the food insecurity they experience. This initial chapter will examine the background and existing research with the goal of helping the reader understand why the study should be considered. Following this information, the problem statement formed from this existing data will be provided along with a purpose statement, the significance of the study, and research questions to reveal the direction of the study, its overall goal, and operational definitions.

Background

Food-insecure students' completion rates in higher education are lower than their food-secure counterparts (Broton & Goldrick-Rab, 2017). Some scholars have hypothesized it is due to their socioeconomic status and daily challenges, while others have argued their lack of sustenance has impaired their cognition and ultimately, hindered their BPN satisfaction (Busch et al., 2014; Drotos & Cilesiz, 2014; Meza et al., 2019; Wood & Harris, 2018). Both positions carry valid arguments for why food-insecure students are not maintaining the pace set by their food-

secure peers. However, there are limited studies to thoroughly prove these hypotheses. For example, a college student's autonomy, competency, and relatedness, which are the measurables of BPN, have not been quantitatively or qualitatively compared with food insecurity to determine if there is a relationship between the two. This has been confirmed by examining the most recent literature. Rather, most of these existing studies have pertained to finding factors from which food insecurity in college students emanates as well as learning how food insecure students interact with collegiate programs like food pantries (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015). The researchers from these studies have noted that internal factors like mental focus, mental clarity, and self-image are affected by food insecurity. They have also found that external factors like home life, cash flow, and social influence truly affect a food-insecure student's academic outcomes and achievement rate (Busch et al., 2014; Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015). While each of these factors is very important for a student's ability to learn, scholars still have many unexplored topics surrounding food-insecure college students. That is especially the case when it comes to examining their level of food security and the way it affects aspects of their BPN, which are essential for learning and applying what is provided in courses. These aspects are a student's (1) autonomy satisfaction, (2) competency satisfaction, and (3) relatedness satisfaction (Adams et al., 2017; Ryan & Deci, 2000, 2016).

Historical

Food insecurity as well as student BPN and motivation are world-wide issues that have been of concern for decades (Christian & Dillon, 2018; Wood & Harris, 2018). Even after years of heightened concern, the issue is not fully resolved today (Hagedorn & Olfert, 2018; Hollifield-

Hoyle & Hammons, 2015). Furthermore, between 15% and 39% of college students are affected by food insecurity (Nikolaus et al., 2019a; Silva et al., 2015).

The exploration of food insecurity among college students and how it affects their BPN is relatively new in the world of education. Therefore, there was no immediately relevant literature available. Fortunately, historical and longitudinal studies consisting of adult or child participants were examined with the goal of determining how nutrition affects IQ or academic achievement. For instance, two studies had participants take IQ and cognitive tests to determine how their malnourishment during infancy and childhood affected their learning abilities as adults (Araujo et al., 2014; Waber et al., 2014). The results of these tests were compared with the anthropometrics and nutritional history of each subject to see how these variables affected their learning capabilities (Araujo et al., 2014; Waber et al., 2014). Sadly, those who had a history of severe malnourishment were determined to be intellectually disabled as adults and were incapable of matching the IQ and cognitive test scores of their nourished peers (Araujo et al., 2014; Waber et al., 2014). Fortunately, another study determined there is hope for these malnourished and food-insecure individuals in the world of nutrition. In a "randomized, double-blind, treatments and placebo" study conducted by Portillo-Reyes et al., it was found that improving food security provided impoverished students with the necessary "brain food" to achieve greater levels of cognition (2014). Therefore, evidence exists that positively links food security with improved cognitive function. Some of the improved areas included "processing speed, visual-motor coordination, perceptual integration, attention, and executive function" (Portillo-Reyes et al., 2014, p. 861).

Studies on student academic achievement and seasonal food shortages have also been taken into consideration over the years, and the results have been mixed (Christian & Dillon, 2018). For example, in a recent longitudinal study, it was found that students who were affected

by seasonal food shortages only had a 2% decrease in their educational attainment compared to their counterparts who had not been affected by food shortages whatsoever (Christian & Dillon, 2018). However, studies conducted in areas more severely affected by seasonal food shortages had more significant results. For example, one study conducted in a severe drought period revealed a 14% decrease in student educational attainment (Christian & Dillon, 2018).

In recent years, a study concerning food insecurity and academic success was conducted with a convenience sample of 692 participants. Unsurprisingly, it was found that food-insecure students had an average GPA of 3.33 with a standard deviation of .03 grade points, while students classified as food-secure had a GPA of 3.51 and a standard deviation of .02 grade points (Hagedorn & Olfert, 2018). Additionally, the researchers discovered students with food insecurity were more likely to spend their money on "non-food" items and pay for housing before considering the possibility of buying food for themselves (Hagedorn & Olfert, 2018).

With 15% to 39% of college students affected by food insecurity in the United States, there is a need within higher education institutions and their surrounding communities to better understand the challenges this portion of the student body faces on and off campus (Freudenberg et al., 2019; Nikolaus et al., 2019a). As reported by Silva et al., 87.5% of this student population self-reported their food insecurity status affected their performance in the classroom (2015). Furthermore, studies have proven that food insecurity negatively affects the chance of completing a post-secondary degree as well as significantly affecting a student's GPA (Hagedorn & Olfert, 2018; Hollifield-Hoyle & Hammons, 2015). Since food insecure students struggle with focusing and performing well in the classroom, completing their degrees, and matching the GPA of their peers, it indicates each student's basic psychological needs are most likely hindered by their need and lack of sustenance.

Society-at-Large

Universities and communities need to be provided with data confirming the assumption that food-insecure students' BPN is hindered by their lack of sustenance and peripheral challenges. By having this information, each institution and neighborhood will be able to come alongside these students and meet their needs, all while improving the number of skilled and knowledgeable college graduates transitioning into society. If there is a failure to meet this need, universities will be unable to bring out the best in each of their students and the communities they enter (Hemelt & Marcotte, 2016). Therefore, given the positive links between food security and cognitive ability and the notable threat that food insecurity poses to student achievement, the results of this study will be useful. Knowing the links between food security and student BPN will identify an unspoken need and will lead to implications for building optimum learning environments.

Similarly, communities should be concerned about food insecurity among college students because they will not receive the greatest potential in their future leaders, educators, politicians, and businesspeople for the future. Therefore, food insecurity affects society at large because it hinders the capacity and capabilities of roughly 30% of college students as they strive to learn, which, in turn, hinders future leaders, businesspeople, and contributors to society (Nikolaus et al., 2019a; Silva et al., 2015). Without amending this issue and determining how to increase this population's BPN and success in life, a decrease in intellectual and practical skills among this populace will occur, resulting in lost leadership and professional potential that could improve society. However, this can be avoided by intentional research that starts by determining whether a predictive relationship exists between food insecurity and a college student's BPN satisfaction in autonomy, competency, and relatedness.

Theory

Since food insecurity comes from a myriad of extrinsic challenges and fosters intrinsic trials, it is vitally important to employ an effective lens for understanding why students think and act the way they do (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015; Zein et al., 2018). Therefore, the lens most ideal for understanding a learner's process of thought and intrinsic motivations in this study will be Maslow's Hierarchy of Needs Theory (1943). This theory provides the researcher with information on how and why students with food insecurity may have different levels of motivation and well-being as well as hopes and aspirations compared to their food-secure peers in learning due to their lower-level needs not being met (Maslow, 1943). To further support Maslow's theory, the Self Determination Theory will be utilized to better understand how higher-level needs, such as esteem and self-actualization, affect a student's ability to learn (Adams et al., 2017; Maslow, 1943; Ryan & Deci, 2000, 2016). Meaning that if student nourishment is lacking, then student motivation, well-being, desire to learn, hopes, and aspirations will be threatened, illustrating the need to study the relationship between food insecurity and student BPN.

Similarly, it is important to note that a person's external experiences and motivations affect their basic physiological needs, self-determination, and BPN. Therefore, the Social Exchange Theory and the Social Learning Theory will be utilized and examined to better understand food-insecure students. The social exchange theory will help the researcher understand why a student would choose to persist or forgo their education. For example, they may persist because of their belief that the long-term return from a degree and the learned skill is well worth the effort. On the other hand, the desire of a student to forgo their education and learning may be to meet an immediate need for themselves or their families (Homans, 1958). The social learning

theory provides the researcher with a better understanding of why students with food insecurity may believe they are unable to gain a degree and greater learning due to the thought patterns they have developed from listening to and watching those around them (Bandura, 1978).

Maslow's Hierarchy of Needs Theory, along with each of these supplementary theories, provides vital aspects of a student's story with food insecurity. This lower-level need on the hierarchy scale carries prevalence in a person's priorities no matter the level of education being pursued (Maslow, 1943). Furthermore, every student is affected by and reacts to circumstances around them; each student has learned to think in certain patterns because of those they spend time with, and, depending on their satisfaction in autonomy, competency, and relatedness, each student will have different states in which their BPN is met (Adams et al., 2017).

Problem Statement

With roughly 15% - 39% of college students in the United States classified as food insecure, scholars have diverted their attention to this population (Nikolaus et al., 2019a; Perez-Felkner et al., 2020). In fact, studies have been conducted on segments of this population to determine whether one is more greatly affected than others. The results of these studies indicate students at all levels of higher education may experience food insecurity (Camelo & Elliott, 2019; Perez-Felkner et al., 2020; Phillips et al., 2018; Wood & Harris, 2018). Rather, a student's homelife, upbringing, familial background, personal and family finances, location in which they live, and job availability all play a role in whether they will be challenged with food insecurity (Camelo & Elliott, 2019; Perez-Felkner et al., 2020; Phillips et al., 2018; Wood & Harris, 2018).

When one of these aspects negatively impacts food security, studies have shown student academic achievement, GPA, attendance, and mental well-being begin to decline (Camelo & Elliott, 2019; Laska et al., 2021; Meza et al., 2019; Phillips et al., 2018; Zein et al., 2019). All

these results seem to indicate that a food-insecure student's basic psychological needs, which consist of an inherent need for autonomy, competency, and relatedness in a learning environment, are affected negatively as well (A. L. Duckworth et al., 2007; Ryan & Deci, 2016). However, there is no research to support this (A. J. Hale et al., 2019).

Fortunately, A small number of researchers have begun to examine findings in post-secondary institutions with Maslow's hierarchy of needs theory as the fundamental foundation from which one can understand a student's motivation and drive as well as determine solutions for challenges that may limit that motivation and drive (Ergin & Karataş, 2018; A. J. Hale et al., 2019; Perez-Felkner et al., 2020; Shi & Lin, 2020). Sadly, the work is immense, and there is an inherent need for further investigation into what needs and insecurities exist among college students and how they interact with one another (A. J. Hale et al., 2019; Noltemeyer et al., 2021; Perez-Felkner et al., 2020; Shi & Lin, 2020). Shi and Lin (2020) stated in their work, "Understanding the levels of the needs among learners could be beneficial for educators and practitioners to craft more active and optimal teaching or counseling strategies." Furthermore, A. J. Hale et al. (2019) concluded from their study that "a research agenda centered on Maslow's model would powerfully advance its applicability as a contemporary paradigm for addressing professional well-being and could encompass examination of the incremental value of multipronged approaches over singular ones and comparative effectiveness studies of higher-level interventions compared to lower-level ones." There have been no studies seeking to address the identified gaps by Shi and Lin (2020) and A. J. Hale et al. (2019) in the education community. In response to this gap, a predictive relationship between a college student's food insecurity, a physiological need, and their basic psychological needs (BPN), which fall under Maslow's categoriza-

tion of esteem and self-actualization needs, will be examined to help develop a baseline for future research focused on determining whether meeting physiological needs does in fact increase a college student's self-esteem and self-actualization needs. Therefore, the preeminent problem is the literature lacks information on what particular hierarchy of needs college students have and whether there is a connection between the effectiveness of meeting "physiological needs" and elevating a student's higher esteem and actualization needs (A. J. Hale et al., 2019; Noltemeyer et al., 2021; Perez-Felkner et al., 2020; Shi & Lin, 2020).

Purpose Statement

The purpose of this quantitative predictive correlational study is to examine whether the dependent variable, BPN, is related to the independent variable, a student's level of food insecurity, at community, private, and public colleges. BPN is defined as a student's level of academic competence, autonomy, and relatedness within the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS Scale) as they strive to learn (Adams et al., 2017). Food insecurity is defined as a student's "food-related behaviors and experiences associated with increasing difficulties in accessing food due to resource constraints", and it will be rated with the Food Insecurity Experience Scale (FIES) to determine their access to food, or lack thereof, over a year-long period (FAO, 2020). The sample of this study will be comprised of 200 students at six different institutions within the state of Florida, and the study will be accomplished over a one-semester period.

Significance of the Study

By utilizing facts and data from previous studies as well as employing a proven measurement tool based on the self-determination theory and the BPNSFS scale, a true understanding of how a food insecure college student's BPN may differ from students who are not experiencing

food insecurity (Adams et al., 2017; Ryan & Deci, 2016). Participants at the post-secondary level will be examined in this current study to determine if there is a predictive relationship between a student's food insecurity and BPN.

If there is indeed a predictive relationship, this information will provide future scholars with a baseline set of data to work from as they seek to further the work done in this area of academia. Scholars and practitioners alike will be able to ask the right questions when interacting with a student who has lower BPN and achievement in the classroom and, in turn, better understand the needs of their students based on food security status. This will allow the formulation of programs and studies around the needs of these students. Additionally, the study will collect general opinion data within the scales to determine if students believe fellow students and faculty around them really help increase their BPN. By discovering whether those around them are helpful in their current capacity, researchers and practitioners will have a secondary baseline of data as they strive to help this student population (Silva et al., 2015). Finally, the results of this study will provide qualitative researchers with new questions because of the results from this study. Which, in turn, will further the body of knowledge related to meeting the needs of college students experiencing food insecurity.

Research Questions

RQ1: Can food insecurity predict student autonomy satisfaction in post-secondary institutions?

RQ2: Can food insecurity predict student competency satisfaction in post-secondary institutions?

RQ3: Can food insecurity predict student relatedness satisfaction in post-secondary institutions?

Definitions

1. *BPN* - A student's level of academic competence, autonomy, and relatedness as they strive to learn (Adams et al., 2017).
2. *BPNFS* – (Basic Psychological Needs Frustration and Satisfaction scale) "A set of original questionnaires that assess the degree to which people feel satisfaction of these three needs that are: Competency, autonomy, and relatedness. There is a: general form, as well as domain specific forms for work and relationships ("Basic psychological need satisfaction, and frustration scales", n.d.)."
3. *FIES* – Food insecurity experience scale. This measurement tool determines the severity of a student's level of food security with eight questions (FAO, 2020; Wambogo et al., 2018).
4. *Grit* – "The sustained perseverance and passion for long-term goals" (Duckworth, 2018).
5. *Maslow's Hierarchy of Needs Theory* – A five-tier model consisting of needs individuals are motivated to meet. Starting from the lowest tier to the greatest, they are physiological, safety, love and belonging, Esteem, and self-actualization (Maslow, 1943).
6. *Self-Determination Theory* – The intrinsic and extrinsic motivations of students affect the outcome of their learning. A student's competence, autonomy, and relatedness play their part in the process of a student's self-determination (Ryan & Deci, 2000, 2016).
7. *Social Exchange Theory* – The value a person gets from what they do will drive them to act in a manner that benefits them the most (Homans, 1958).
8. *Social Learning Theory* – The learned processes a person gains from watching and learning from peers, parents, colleagues, and superiors as well as what transpires around them (Bandura, 1978).

CHAPTER TWO: LITERATURE REVIEW

Overview

During this review, empirical studies are thoroughly examined to determine how researchers and educators increase the Basic Psychological Needs of food-insecure college students. Since there is no defined tactic for helping this student population, this chapter will inspect relevant and related literature. The first section of this literature review will introduce framework-based theories that apply to the central phenomenon. In the second section, recent literature on social and financial challenges for impoverished students, nutrition's effect on academic success, and nutrition's effect on cognitive function will be examined and synthesized. Finally, there will be a discussion on the apparent gap found in the literature and the need for further study on increasing the capacity to learn in food-insecure college students.

Theoretical Framework

Each individual's drive to be a part of society greatly affects one's desire to conform and integrate their behavior into the expectations of others (Bandura, 1978; Homans, 1958; & Ryan & Deci, 2016). In this literature review, college students with lower socioeconomic status will be examined to determine their drive to stay in school, attend class, and succeed in academics. Furthermore, findings on how hunger and food insecurity affect decision-making will be considered. Therefore, Maslow's Hierarchy of Needs will be the primary construct used for understanding a food-insecure student's actions and growth with the self-determination, social exchange, and learning theories as supporting ideologies to consider as well.

Maslow's Hierarchy of Needs

Physiological needs, especially when unsatisfied, are the basis from which people will be motivated to adapt priorities and lose focus on higher-level goals and needs such as esteem and

self-actualization (Maslow, 1943). Students attending post-secondary institutions are not dissimilar. They may be faced with unsatisfied physiological needs regardless of what certification or degree they are pursuing (Camelo & Elliott, 2019; Perez-Felkner et al., 2020; Phillips et al., 2018; Wood & Harris, 2018). In 1943, Abraham Maslow determined through observation and his work as a psychologist that individuals are "wanting" and seek to meet their wants. Furthermore, Maslow believed no individual could entirely meet all their wants (1943). Rather, some are "partially satisfied" and others "partially unsatisfied" (Maslow, 1943). Maslow posited that individuals would strive to meet wants on a hierarchy scale that started with essential physiological needs and would progressively move up the hierarchy to where an individual would want to achieve self-actualization (1943). Due to his belief that individuals were not able to meet all their wants but rather had them mostly satisfied or unsatisfied, each person would be at different places on the hierarchy of needs he developed. Not one person would ultimately fulfill their wants and requirements pertaining to physiological needs, safety, love and belonging, esteem, and self-actualization. Rather, each individual's journey would create a mosaic of growth, fulfilled needs, and satisfied wants (Farimani & Shahri, 2020; Maslow, 1943). However, Maslow believed "basic threats" can create "general emergency reactions" in people where their focus is hijacked, and they are no longer seeking to satisfy wants (1943). Instead, individuals will begin to address the essential needs that are created by the "basic threats" that generally consist of physiological needs (Camelo & Elliott, 2019; Maslow, 1943; Perez-Felkner et al., 2020; Phillips et al., 2018; and Wood & Harris, 2018). Therefore, Maslow's insights indicate that to help college students develop their BPN, an aspect of esteem and self-actualization needs, it is important to help learners avoid "basic threats", like food insecurity, as they strive to learn (1943).

Self-Determination Theory

While external factors, formed through social situations, truly affect college students' decision-making processes and drive to succeed, intrinsic motivators also play a significant role (Adams et al., 2017; Ryan & Deci, 2000). In fact, the influence intrinsic motivators have is great enough to change a person's decision-making trajectory (Adams et al., 2017; Ryan & Deci, 2000, 2016). In the 1970s and 1980s, Ryan and Deci participated in exploratory drive experiments, based on the drive theory, with participants to determine how they respond to stimuli (Gagné, 2015). While conducting these experiments, it was discovered that participants were not responding as anticipated. Not all participants attempted to avoid "pain" or "anxiety" with each new experience (Gagné, 2015). Rather, these participants were driven to explore each experience through their "intrinsic desires and excitement to discover new things" (Gagné, 2015). Consequently, Ryan and Deci (2016) have explored this phenomenon, affirmed it through research, and developed the results into the Self-Determination Theory. The use of this theory and its coinciding work is invaluable for higher education practitioners and administrators seeking to help students who lack academic drive and face an assortment of academic challenges. For example, Ryan and Deci have conclusively found intrinsic motivators can be enhanced and hindered through external forces (Adams et al., 2017; Ryan & Deci, 2000, 2016). To enhance a student's intrinsic motivations, vested parties must address the "psychological needs" students have by providing opportunities for them to develop greater "autonomy, competence, and relatedness" (Ryan & Deci, 2000, 2016). This may be accomplished through providing students with cognitive and non-cognitive resources which consist of positive and intentional education, as well as reinforcement, from faculty within social resources like mentorship programs, tutoring, and off-campus opportunities (Adams et al., 2017; Ryan & Deci, 2000, 2016).

Social Exchange Theory

While conducting research on how to increase a food-insecure college student's BPN, it became evident that many food-insecure students were challenged with financial instability, poor familial support, and social stigmas (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015; Zein et al., 2018). In the social exchange theory, Homans (1958) determined every person is motivated, consciously or unconsciously, to behave in a way that benefits them in each social context. In 2014, there was evidence of students utilizing a cost-benefit analysis to determine if they should remain in college or drop out to get a job and ease the stressors in their lives (Drotos & Cilesiz, 2014). This dilemma creates a circumstance in which each student will choose to act on what they perceive to be valuable (Homans, 1958). Furthermore, each student's perception will be affected by their desire to receive approval from their social circles and find a place of equilibrium (Homans, 1958). Therefore, one student may find the benefit of staying in college more attractive because their family sees the value of a degree, while another student may choose to drop out of college and pursue a job due to their needs or because they are considered a deviant in their social circles for trying to achieve something that is outside of the norm (Homans, 1958).

Social Learning Theory

To further understand why impoverished and food insecure students choose to neglect collegiate success, it is important to consider how and why they have developed their thinking patterns. As Bandura (1978) stated in the Social Learning Theory, each person learns from the many interactions they have in social settings. For example, one may gain cognitive and behavioral queues by watching their parents, friends, teachers, and peers during moments of instruc-

tion, times of play, moments of reprimand, or conversation (Bandura, 1978). Furthermore, individuals can be influenced by the environmental responses that occur when they, or others, are acting on those cues (Bandura, 1978). For example, impoverished students may have their parents tell them a college degree is valuable and important. Shortly after, a friend may attempt to go to college, drop out due to difficult circumstances, and instead find a good-paying job. The conversation with the student's parents prompted a new thought process for learners to consider. However, it was not reinforced because of their friend's environmental experience. Instead, the friend's experience of receiving a good job may cause the student to pick up a new learning cue, neglect college altogether, and find a job. This example emphasizes Banduras '(1978) claim that the process of delivery is vital. The student received a stronger process of delivery from the friend who had an environmental experience than the verbal information received from their parents. Therefore, the result could have been different if the parents of these students chose to connect them with a mentor, or other options, to reinforce the value of college attainment because the form of delivery would have been stronger than a verbal cue (Bandura, 1978; Busch et al., 2014).

Related Literature

Exploration of food insecurity, nutrition, and a college student's capacity to learn have hardly been compared within the body of education literature. Consequently, the goal of the literature being reviewed in this portion of chapter two will strive to examine how food insecurity and malnourishment affect a student's GPA, mental well-being, school attendance, IQ, and physical ailments since there is little to no literature that discusses food insecurity and BPN to prove the need and validity of the study. This will include, but is not limited to, the examination of lon-

gitudinal studies that follow individuals into adulthood while measuring their growth and IQ, nutritional studies on supplements and their aid in student cognition, studies on seasonal malnourishment, and food insecurity's effect on college students. Each study will help piece together the mosaic of information necessary for understanding how to help food insecure students by examining the effect of impoverishment on college students, social and financial challenges for impoverished college students, food insecurity and its effect on the body, nutrition and academic success, as well as nutrition and cognition. It should be noted that food insecurity and impoverishment are not synonymous. Food insecurity is a measured psychometric that allows a researcher to understand a person's perceived food-security status and accessibility to food while impoverishment is diverse and can refer to, but is not limited to, a person's financial and demographic standing or ability to have necessary goods for living (fao.org).

Impoverishment and the Effect on College Students

During Hollifield-Hoyle and Hammons' qualitative study with impoverished community college students (n=18), it was discovered that only 30% of this population succeeded in receiving a college education (2015). Remarkably, these graduates were only able to accomplish this achievement through self-determination and having a healthy level of self-efficacy (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015). Sadly, the remaining 70% of students in the study were greatly afflicted by being unable to pay for their personal needs and education, and they did not have the grit or self-efficacy to push through these challenges (Hollifield-Hoyle & Hammons, 2015). These personal needs commonly surround food insecurity and homelessness (Silva et al., 2015). If these needs are not addressed, class attendance and class performance decrease. For example, 58.6% of college students afflicted by food insecurity were "somewhat to very affected" in their class attendance, and 87.5% were "somewhat to very affected" in their

class performance (Silva et al., 2015). Consequently, if college students are impoverished, are food insecure, and are struggling with homelessness, it is likely that they will also have unmet BPN in comparison to their non-secure peers due to the findings of poorer academic performance and less time in the classroom.

Social and Financial Challenges for Impoverished College Students

As Hollifield-Hoyle and Hammons began to interview 18 impoverished college students in their qualitative study, it was quickly discovered that all the students were receiving financial aid (2015). However, the aid received was not near the amount required for these students to pay for tuition, books, and personal needs (Broton & Goldrick-Rab, 2017; Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015). Generally, the personal needs and unforeseen costs are thousands of dollars greater than the aid provided to students. For example, it was determined that an average of $8,300 is the "out of pocket" amount American community college students must have to eat properly, pay for housing as well as unforeseen school expenses each year (Broton & Goldrick-Rab, 2017). The number is even higher for students attending four-year public colleges, with an annual average amount of $12,300 (Broton & Goldrick-Rab, 2017). This financial expense is nearly impossible to overcome, considering most food-insecure students are already taking the same initiative as their food-secure peers by averaging 30 hours of work each week and cannot earn enough to cover all of their collegiate expenses (Broton & Goldrick-Rab, 2017). Consequently, these students are more than three and a half times more likely to neglect their studies in favor of earning money to meet their financial needs, as found by Phillips et al. in their study on "food insecurity and academic disruption" (2018).

In addition to insufficient aid, several researchers found this student population lacked the ideal support systems for success (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons,

2015; Silva et al., 2015). For example, many of these students came into college ill-informed and poorly equipped because they did not have people available in their social circles to help them prepare for and succeed in their courses. Furthermore, the general college preparation provided to the average students, including food-insecure students, received in high school was insufficient (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015). Therefore, researchers have suggested that higher education institutions should consider listening to this student population, providing information on financial support, tactics for collegiate success, and collaborating with high schools to help impoverished students receive the knowledge and information necessary for success before they enter college (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015).

Academic Performance with Social Barriers

When students have these social and financial challenges, their self-worth and motivation in the classroom decline significantly (Drotos & Cilesiz, 2014; Silva et al., 2015). Since this is the case, Drotos and Cilesiz (2014) decided to perform a quantitative study on how a preparatory course for impoverished students in college would help with persistence and success. The course focused primarily on building each student's "motivation, self-worth, and critical thinking" (Drotos & Cilesiz, 2014, p. 48). To test its effectiveness, a student's grades, attendance, and persistence were compared with a control group. Consequently, it was found that there was no statistically significant difference between the 170 students who participated in the course when compared with the 76 students in the control group. However, the research team discovered through interviews that it significantly impacted some students during their pursuit of a college degree. While this finding reinforces the social learning theory's constructs, it does not help most impoverished students in a college setting.

Unmet Psychosocial Development in Low Income Students

In a hermeneutical phenomenology study conducted by Wilson (2019), 40 low-income college students were interviewed with 30 open-ended questions to gather their personal thoughts on their psychosocial needs, how they were being met, how their needs could be better met, and how they could better meet their own needs (Wilson, 2019). The participants in the sample consisted of low-income college freshmen who were: "high achievers at the community college study site", "average achievers at the community college site", and "high achievers at the four-year university study site" (Wilson, 2019). At the conclusion of Wilson's study, it was found that all of the students agreed they needed "to be more conscientious, to improve self-esteem, to address spirituality, to become socially engaged with instructors and peers, to receive moral support, encouragement, and motivation from others, and/or to engage in experiential learning experiences" (Wilson, 2019). While these responses were consistent within the larger body of knowledge on student psychosocial health, it is important to note that students in this study felt like their psychosocial needs were not met by professors, by campus opportunities made available to them, or by their peers (Wilson, 2019). Granted, some of the participants admitted they could try harder to help cultivate and strengthen their psychosocial health, while others could not be involved with on-campus activities due to working off-campus throughout the day (Wilson, 2019). After examining the collected evidence and asking about each student's persistence to complete their academics, Wilson found many of the students were contemplating whether to leave their academic institution due to the feeling of isolation and unmet psychosocial needs and not because of academic struggles (2019).

Even for high-achieving, low-income students, there are barriers to their academic success and BPN on a college campus. Some may be required to work and will miss out on vital

psychosocial opportunities for growth and fulfilling life experiences, while others may feel isolated due to the lack of faculty, campus student life, and peer interactions. With hindrances such as these, persistence and learning are at risk for these students even though they may be hard-working and strive for high achievement. With these challenges, it is essential for higher education institutions to consider how they can prepare and aid low-income students so they can succeed.

Parental View of Paying and Supporting College Pursuit

As students near the years of attending college, they must rely on their caregivers for guidance, financial support, and emotional support. Warnock (2016) decided to explore how race, ethnicity, and socioeconomic status affect a caregiver's perception of how to pay for college. To conduct an effective study on this query, Warnock (2016) utilized data from the National Education Longitudinal Study (NELS) to grasp how African American, Asian, Hispanic, and white parents counseled or financially helped their children as they were preparing to go into higher education (Warnock, 2016). By doing so, the author was able to compare parental aid, a student's initial plans, what ultimately happened concerning college attendance, and their success years later (Warnock, 2016). The researcher collected a "stratified probability sample of almost 24,599 students in 1,052 public and private eighth-grade schools." (Warnock, 2016). With this large sample and utilizing multiple regression, Warnock was able to determine that African American parents were more willing to go into debt for their up-and-coming students, and they were more apt to encourage their children to take out loans as a tactic to get a college degree (2016). Surprisingly, this finding was significantly different than that of Asian, white, and Hispanic families (Warnock, 2016). Furthermore, African American and Hispanic parents who were classified as middle to upper-class were less likely to report they had the means to pay for their

child's education in comparison to white parents with similar means (Warnock, 2016). Concerning Asian parents, the author hypothesized this demographic would have similar results to that of white parents due to the success of Asian college students. Surprisingly, that was not the case. Rather, "Asian parents regardless of language status" were not similar to white parents. They would carry the same beliefs as their African American and Hispanic counterparts (Warnock, 2016). The only exception to this finding was when an Asian parental unit was able to speak English and was middle to upper-class. In these circumstances, Asian parents would align with their white counterparts (Warnock, 2016). Predictably, Warnock found, regardless of race or ethnicity, "low-income and less educated parents" believed it was impossible for them to pay for higher education (Warnock, 2016). Furthermore, this demographic of parents was not familiar with the expenses of college and the time required for students to be successful in college (Warnock, 2016). They were also not familiar with the availability of scholarships, grants, and federal student loans. These caregivers believed their students would be able to pay for a college education through working while attending classes. With the lack of parental support in some low-income and poverty-stricken homes, the possibility of collegiate success for these students decreases significantly (Warnock, 2016). Therefore, this external problem is a confounding variable that adds to the challenges of food-insecure students and could negatively affect their capacity to learn.

Value of Familial Support in a Low-Income College Students Success

Roksa and Kinsley (2019) recently conducted a study with low-income college students to determine how vital family support is for this demographic's preparedness and success at the collegiate level. With a sample of 728 first-year students spread across eight different institu-

tions, all of whom were classified as low-income, the research team examined how much financial and emotional support each student received from their families and how it affected their GPA and whether they completed at least 24 credits in the year (Roksa & Kinsley, 2019). To measure how much emotional and financial support a student received over their first year period, two Likert scales, the emotional support and financial support scales, were employed as a means to gather information related to each variable (Roksa & Kinsley, 2019). To compare and contrast GPA, credits completed for the year, emotional support, and financial support, Roksa and Kinsley used logistic regression models (2019).

At the conclusion of Roksa and Kinsley's research, it was found that the more emotional support a low-income college student received from their caregivers increased their likelihood of having a GPA of 3.0 or higher (2019). Furthermore, they were "more likely to accumulate at least 24 more credits" for the first academic year and were found to be "more likely to persist through a second year of college" than low-income students who received less emotional support (Roksa & Kinsley, 2019). Surprisingly, familial financial support was not significant for the general population of the sample and did not create a positive result for the participants in the study (Roksa & Kinsley, 2019).

For students from low-income homes, familial emotional support is a rare commodity (Roksa & Kinsley; Warnock, 2016). Yet, if it is present, it greatly aids students in their academic endeavors. Sadly, not all college students from low-income families have this support and may not receive the help necessary to navigate their first year of college (Warnock, 2016). Therefore, it is essential that schools consider providing mentors who can provide emotional support as this student population strives to persist and succeed (Wilson, 2019).

Predictors of Food Insecurity

In a "cross-sectional non-experimental study" conducted by Miles et al., 496 students were surveyed in a "pacific northwest public university" to determine whether students involved in the university's social work programs were affected by food insecurity (2017). In addition to this, the researchers wanted to understand what "coping strategies" and "resources" these students used (Miles et al., 2017). By using questions from the USDA food insecurity scale and 15 questions related to the home life and food availability of the students in the study, Miles et al. found that 43% of the participating students in the study experienced food insecurity the year prior to the results of the study (2017). Unsurprisingly, three particular groups in the social work programs were more likely to have food insecurity. First-generation students (53% of this group), females (49% of this group), and students of color (63% of this group) were found to be most likely to experience food insecurity (Camelo & Elliott, 2019; Laska et al., 2021; Miles et al., 2017). Furthermore, students who were found to be food insecure in the study were put in positions of having to pay more towards books, health insurance, course materials, public transportation, and school supplies (Miles et al., 2017). Therefore, food insecure students resorted to working extra hours at their jobs, buying less expensive foods, sharing food with others, "avoided paying bills on time, utilized food banks, and "SNAP benefits" (Miles et al., 2017).

Ethnicity, First Generation Status, and College Student Food Insecurity

In a California-based study with 6,103 community college students, researchers Wood and Harris (2018) took it upon themselves to better understand whether a student's background, including their ethnicity, increased the odds of having food insecurity as well as on-campus social challenges (Wood & Harris, 2018). To collect this data, the research team utilized a census sample to gain participants and had students physically answer a "paper-based" survey referred

to as the Community College Success Measure (CCSM) (Wood & Harris, 2018). To analyze and interpret the data, the research duo utilized "descriptive statistics and logistic regression" (Wood & Harris, 2018). The results of their study showed that "multi-ethnic students had the highest rate of food insecurity at 16.5%" within their ethnic sample. Black students were the next highest ethnic group, with 16% afflicted by food insecurity, Latinos had 10.4%, and Asians as well as whites were identical at 9.2% (Camelo & Elliott, 2019; Phillips et al., 2018; Wood & Harris, 2018). After finding these results, Wood and Harris (2018) began to examine other significant identifiers among students with food insecurity. For example, it was found that white and Asian students from low-income families, making $30,000 or less per year, had greater odds of being food insecure, with low-income white students at 82% and Asian students at 158% with a statistical significance of $p < 0.01$ (Phillips et al., 2018; Wood & Harris, 2018). Strangely, being low-income within the other ethnic student groups "was not a significant predictor" (Wood & Harris, 2018). Concerning a student's age and their risk of experiencing food insecurity, it was found that only white students were affected because of their age. For white students between the age of 25-31, it was found that there was a 238% greater odds for them to have food insecurity ($p < 0.01$) (Phillips et al., 2018; Wood & Harris, 2018). It should also be noted that researchers have determined all first-generation college students are more likely to be food insecure compared to their peers (Camelo & Elliott, 2019; Phillips et al., 2018).

Unsurprisingly, housing insecurities and legal concerns were also influencers for every ethnic student group when it came to facing food insecurity (Wood & Harris, 2018). For example, the group most affected by housing insecurities were white students, who had a 369% greater chance of facing food insecurity, while black students were not far behind, coming in with a 320% greater chance of facing food insecurity ($P < 0.001$) (Wood & Harris, 2018). Multi-

ethnic students with legal concerns were also found to have a 251% greater chance of dealing with food insecurity ($p < 0.001$) (Wood & Harris, 2018).

Food Insecurity and Academic Achievement Among Different Collegiate Groups

By using data collected from 3,245 participants with a specifically designed survey for measuring food insecurity in students at a western college, Camelo and Elliott (2019) explored whether post-secondary learners' food insecurity affected their GPA. To determine the results of the researchers' data, Mplus software and the structural equation model were utilized to place food insecurity as a mediating variable between student characteristics and GPA (Camelo & Elliott, 2019). At the conclusion of their research, four primary niche groups within the college they studied faced food insecurity more often than the remaining groups and had "relatively lower grades" (Camelo & Elliott, 2019). These four groups are: Hispanic students, first-generation students, black students, and Pell grant eligible students.

Food Insecurity, Homelessness, and Academic Performance

In a quantitative survey-based study by Silva et al., it was found that 97 out of 390 college students reported themselves to be food insecure or homeless (2015). Furthermore, 58.6% of the students that had food insecurity and 47.6% of the homeless students claimed to be "somewhat to very affected" by their problems when it came to class attendance. Unsurprisingly, this percentage jumped in both groups when each was asked about their challenges and class performance. For food-insecure students, 87.5% felt like their problems affected their ability to perform well in class, while homeless students were not far behind at 81% (Meza et al., 2019; Silva et al., 2015). These responses confirm that students are heavily driven to take care of their imme-

diate needs. Therefore, attendance and academic success do not take precedence over their concern of finding food and a place to sleep, which is in line with Maslow's Hierarchy of Needs Theory and the Social Learning Theory (Bandura, 1978; Phillips et al., 2018).

Mental Health Disparities, Food Insecurity, and Sociodemographics

Due to many small studies conducted in the area of college students and food insecurity, Laska et al. (2021) determined it was time for their team to conduct a study with an extensively large sample of 13,270 participants. By doing so, the results provided more definitive findings and a smaller margin of error (Laska et al., 2021). Twenty-seven postsecondary institutions in the state of Minnesota participated in this study over the years 2015-2018. Thirteen of these institutions were community colleges, with the remaining 14 being four-year universities (Laska et al., 2021). To determine a participant's level of food insecurity, the research team utilized a "two-item validated screener" that only allowed for a binary result of the participant either having food insecurity or not. Furthermore, the team encouraged participants to report their health, drug use, drinking habits, and GPAs (Laska et al., 2021). At the conclusion of the study, it was found that 24% of the college students involved were food insecure (Laska et al., 2021). For specific niche and minority groups, it was found that non-Hispanic black students (43% of this group), first-generation students (33% of this group,) and transgender/non-binary students (42% of this group) were more greatly affected by food insecurity than any others (Laska et al., 2021). Unsurprisingly, students who were found to have food insecurity were more likely to report poor health, poor health habits, more frequent drug use, more frequent binge drinking, and were more likely to have experienced stressful life events in the last year (Laska et al., 2021). With food-insecure students having a greater likelihood of experiencing or practicing these peripheral issues, they may experience major challenges towards attaining the higher tiers mentioned in

Maslow's hierarchy of needs. Consequently, it will be increasingly difficult for students with food insecurity to meet their BPN, especially when it concerns their academics and learning.

Determined Correlates Surrounding Food Insecure Students

In a cross-sectional study with first-year students from eight different U.S. universities, Zein et al. (2019) collected data from 855 participants with the goal of understanding how many freshmen are faced with food insecurity. To accomplish this task, the USDA Adult Food Security Survey Model was used along with other scales and surveys to determine each participant's "perceived stress, sleep quality, disorder eating behaviors" (Zein et al., 2019). To better understand the effects food insecurity has on student academics, the researchers also chose to examine each participant's GPA. After collecting all the necessary data, a chi-square test of independence was used to test "bivariate associations of food insecurity and sociodemographic variables" (Zein et al., 2019). For the difference between student health parameters and food insecurity, an independent t-test was used. Finally, multiple logistic regression was used to determine the relationship of food security status with "health and academic outcomes" (Zein et al., 2019). At the conclusion of the study, it was determined that 19% of the participants were experiencing food insecurity, with an additional 25.3% at risk of falling into the categorization of food insecurity (Zein et al., 2019). Unsurprisingly, students who fell under the categorizations of having lived off-campus, being a racial minority, being a Pell Grant recipient, not having a campus meal plan, or being a first-generation college student were more likely to be classified as food-insecure (Zein et al., 2019).

Additionally, food insecure students were determined to have "greater levels of stress" ($p<.001$), more commonly "practiced disordered eating" ($p<.001$) and "slept more poorly" ($p<.001$) (Zein et al., 2019). It was also found that the food security status of a participant greatly

affected their GPA (p=0.001) (Zein et al., 2019). For example, the participants classified as food secure had a "higher proportion of students with a GPA of 3.5 or higher while their counterparts, food insecure participants, had a higher proportion of students with a GPA of 2.59 or lower. Finally, 56.4% of students were aware of their campus' food pantries. Yet, only 22.2% of the food-insecure students identified in this study actually appreciated and took advantage of them (Zein et al., 2019).

Food Insecurity and Migraines

Nagata et al. (2019a) undertook the task of determining if there is an association between food insecurity and young adult migraines. Data from the National Longitudinal Study of Adolescent to Adult Health (2008) was utilized for an adequate population and information over time to conduct a cross-sectional study. The sample of this study consisted of 14,786 young adults between the ages of 24 and 32 years, with 49.3% of the participants being female and 65.6% being "non-Hispanic white race" (Nagata et al., 2019a). Of the young adults in this sample, 11% were classified as food insecure with the "18-item US Household Food Security Scale" (Nagata et al., 2019a). Furthermore, these food-insecure participants of the sample were found to be more prone to migraines with an adjusted odds ratio of 2.00 (95% CI, $P < 0.001$) (Nagata et al., 2019a). In addition to this finding, the study found 23.9% of food-insecure participants were prone to migraines versus the 13.6% of food-secure participants who were affected (Nagata et al., 2019a). Therefore, it can be affirmed that food insecure young adults have a greater risk of experiencing migraines, which would largely affect their capacity to learn in a classroom.

Psychosocial Health, Food Insecurity, and Academic Consequences

In a recent qualitative study, 25 food insecure undergraduate students who were using a California university food pantry were interviewed by Meza et al. (2019) to determine the psychosocial toll and academic consequences food insecurity had created in their lives (Meza et al., 2019). From a psychosocial standpoint, the researchers found these students carried daily stress from the potential of not having food for every meal, and many were also concerned about disappointing their families as they traversed their education (Busch et al., 2014; Drotos & Cilesiz, 2014; Meza et al., 2019). In addition to these stresses, students reported experiencing sadness, hopelessness, and frustration due to their current lack of sustenance, a belief of not deserving help, inability to foster "meaningful social relationships", and a lack of support from their academic institution (Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Silva et al., 2015). From an academic standpoint, the participants unanimously agreed their focus on academics was at odds with their manifestations of hunger and ultimately inhibited their academic performance (Meza et al., 2019; Silva et al., 2015)

Food Insecurity, Mental Health, and Sleep

To determine if food insecurity affects a young adult's mental health and sleep, Nagata and his team utilized data from the National Longitudinal Study of Adolescent to Adult Health to conduct a cross-sectional study that contained 14,786 participants with ages ranging from 24-32 years of age (Nagata et al., 2019c). The method of the team's analysis was multiple logistic regression that had food insecurity as the independent variable and "self-reported mental health and sleep" as the dependent variables (Nagata et al., 2019c). Three aspects of measuring mental health were utilized to determine a participant's mental well-being. They were as follows: "depression, anxiety, and suicidality" (Nagata et al., 2019c). Of those involved in the longitudinal

study, 11% were food insecure and were found to be more susceptible to mental health challenges and sleep challenges. For example, this population of the study had greater odds of receiving a depression diagnosis from health professionals (“1.67, 95% CI 1.39 - 2.01”), an "anxiety, or panic, diagnosis” (“1.47, 95% CI 1.16 - 1.87”), or self-reporting suicidal ideation over the last year (2.76, 95% CI 2.14 - 3.55”) (Nagata et al., 2019c). Additionally, it was found that food insecure young adults had greater odds of having difficulty falling asleep (“adjusted odds ratio 1.78, 95% CI 1.52 - 2.08”) as well as staying asleep (“adjusted odds ratio 1.67, 95% CI 1.42 - 1.97”) (Nagata et al., 2019c). Due to these findings, it is clear food insecure young adults have a higher propensity to struggle with personal mental well-being and getting a healthy night's sleep more so than their peers who receive proper sustenance. Therefore, food-insecure students are at a clear disadvantage and may struggle to succeed and achieve academic goals as well as retain the information they are learning in the classroom.

Student Behavior and Academic Success

Socioeconomic status, decision-making, self-worth, and interpersonal interactions all affect the outcomes of a student’s success in college (Busch et al., 2014; Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015). Furthermore, they contribute to a student’s actions and behavior (Busch et al., 2014). In a review of longitudinal studies by Busch et al. (2014), it was found that students within a lower socioeconomic status are generally challenged with hunger, bullying, a poor home life, poor support systems, and tend to be influenced by delinquent friends. Each of these challenges may potentially cause students in this population to develop poor learning patterns, which, in turn, may cause a student to mirror the behavior of their poor influencers. If a student chooses to do so, their behavior will greatly hinder their academic performance (Busch et al., 2014; Homans, 1958). Fortunately, researchers have found this

process can be reversed by helping these students get integrated into healthy friend groups, finding an effective support system, and providing opportunities for a mentor (Busch et al., 2014; Homans, 1958).

Food Pantry Use and Its Surrounding Challenges

While food insecurity is not addressed on a case-by-case basis within many higher education institutions, food pantries are commonly made available to help students experiencing food insecurity receive the help they need. In a qualitative phenomenological study, J. A. Hale explored how ten separate colleges and universities successfully provided a food pantry service to needy students (2020). To accomplish this, the researcher utilized operational procedures that consisted of "media and artifact review", email communication, phone interviews, and live interviews. "Food panty funding, physical resources, personnel, food acquisition, donor and community involvement, student access pathways, cross-campus collaborations, service-learning opportunities and curriculum, benchmarks for success, and marketing" were all areas explored in the operational procedures (J. A. Hale, 2020). The results of this study were inconclusive for how to create a standardized approach to creating a successful food pantry in any college or university (J. A. Hale, 2020; Reppond et al., 2018). Rather, it was found that each institution would need to tailor a food pantry to the needs and culture of its students as well as "fit the context of the institution" (J. A. Hale, 2020; Reppond et al., 2018). By doing so, the researcher determined it would allow the program to thrive and last for years to come (J. A. Hale, 2020). In the upcoming paragraphs, research pertaining to how students perceive and use food pantries will be explored, along with how food insecure students could be encouraged to reconsider using this helpful resource.

Food Insecurity and Use of a Food Pantry

In an interpretivist epistemology narrative inquiry study, Daugherty and her team conducted four to six "semi-structured interviews", utilized photo elicitation, and received journals from the three participants in a study to understand their perceptions of "food insecurity and food pantry use" (Daugherty et al., 2019). Each of these students attended Rocky Mountain Institution, which is located in the western region of the Rocky Mountains. The reason the researchers chose this location was due to the fact that the school had an operating food pantry since 2014, and a substantial number of students were considered to be food insecure (Daugherty et al., 2019). The three participants in this study were chosen through purposive sampling based on recommendations from the food pantry staff on campus. At the conclusion of the study, it had become evident to the researchers that each student interviewed was financially independent when they were attending college, with two of the three having this status before starting school and one gaining this status after leaving their parent's home (Daugherty et al., 2019). Each of them utilized the food pantry for different reasons. For example, one used the food pantry program to supplement two of his daily meals with snacks to be satiated, another sought to bring about "enhancing the non-perishables in her home pantry," and the last participant, a mother of one, utilized the program as a way to stretch her budget (Daugherty et al., 2019). When asking each of these students why they used the food pantry program outside of the obvious answers given above, there was one student who had something to add. She desired to be financially free from receiving any outside help as she sought her degree. The choice to use the food pantry made this possible (Daugherty et al., 2019). While each of these students utilized the program, they expressed the challenges they experienced as they considered using the food pantry. This included

navigating stigmas and criticism that surround not having enough funds for food and finances, as well as what society considered to be socially acceptable for seeking help when a person is in need (Daugherty et al., 2019).

Stigmas on Receiving Help

In addition to the challenges food-insecure students face, they are also confronted with social stigmas. In a study conducted by Zein et al. (2018), it was found that only 38% of food-insecure students at the University of Florida took advantage of the food pantry available to them. When the researchers asked the 62% of non-participating students why, it was found that many were afraid of what their friends and others in society would think of them using this aid, others reported they would not utilize the free food because of their self-identity (Zein et al., 2018). This falls in line with Homans 'theory (1958) of social exchange. These students have learned that it is considered shameful to receive handouts and fear rejection from those they interact with (Homans, 1958; Nikolaus et al., 2019b). Consequently, public universities in the United States with food pantries need to take the time to understand this student population's need for dignity by listening, acting on the feedback they receive, and developing alternative options (Drotos & Cilesiz, 2014; Freudenberg et al., 2019; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015). It is especially essential when a student's nutritional well-being is threatened. Proper sustenance will improve mental health and cognition, which, in turn, will greatly increase this population's chance to succeed (Correa-Burrows et al., 2016; Wattick et al., 2018).

Food Insecurity and Its Effect on the Body

On top of having a higher proclivity towards mental health challenges, food-insecure college students also have a greater risk of being in circumstances that cultivate negative effects on their bodies (Nagata et al., 2019b, 2021). For example, it was found in Nagata et al. (2021) study

that women and gay or bisexual men were at greater risk of "trading sex for money" and had greater odds of having STIs, HIV, and chlamydia. With immediate needs due to food insecurity, it was also found that college students may seek to find escape by trading their physical well-being for relief through substance abuse and unhealthy foods (Nagata et al., 2019b, 2021). Sadly, these actions generally have short-term relief and have severe long-term consequences (Nagata et al., 2019b, 2021). However, if lingering food insecurity continues, it may also result in chronic diseases such as diabetes, hypertension, hyperlipidemia, obstructive airway disease, and an unhealthy body mass index that would greatly limit long-term physical welfare (Nagata et al., 2019b, 2021). Therefore, students experiencing food insecurity are potentially placed in a no-win situation with their health. With such potential circumstances, it is essential to understand the threats each food-insecure student may face as they pursue their goals as students.

Food Insecurity, Sexual Risk, and Substance Use

In a study to determine whether food insecurity affects sexual risk and substance abuse in young adults, Nagata et al. utilized the 2008 "cross-sectional nationally representative data of U.S. young adults aged 24-32 years from wave IV" from the National Longitudinal Study of Adolescent to Adult Health (Nagata et al., 2021). The study itself consisted of a "multiple logistic and linear regression analysis" that had food insecurity as the independent variable and substance use, self-reported STIs, and self-reported sexual risk behaviors as dependent variables (Nagata et al., 2021). While examining the data, it was found that 14% of the women and 9% of the men were food insecure (Nagata et al., 2021). Of those classified with food insecurity, women had "greater odds" of having sexually transmitted infections ("1.48, 95% CI 1.13 - 1.92"), chlamydia ("2.06, 95% CI 1.36 - 3.12"), and HIV ("23.34, 95% CI 1.98 - 275.07") (Nagata et al., 2021). In addition to having a greater likelihood of STDs, young, food-insecure women were found to be

more likely to trade sex for money (“2.59, 95% CI 1.19 - 5.66), and having several sexual partners in a 12-month span (1.32, 95% CI 1.01 - 1.73) (Nagata et al., 2021). For food-insecure young men, the general population was unaffected in the area of sexuality. However, young men who identified as bisexual or gay had even higher odds in each area than young women with food insecurity. For example, these participants had odds of 3.17 for STIs (“3.17, 95% CI 1.05-9.60), 77.00 for chlamydia (“77.00, 95% CI 2.23 - 2655.87”), and odds of 30.21 exchanging sex for money (“30.21, 95% CI 3.78 - 241.69”) (Nagata et al., 2021). Concerning the use of substances, it was found that young adults with food insecurity, no matter their gender or orientation, were found to have “greater odds” of using marijuana, methamphetamines, prescription opioids in a non-medical nature, sedatives, and stimulants (Nagata et al., 2021). Consequently, if either an STI or the use of illicit drugs exists in the life of food-insecure students, their ability to be successful and retain the information they receive in the classroom declines significantly (Lam et al., 2007**;** Meda et al., 2017). Therefore, instructors and administrators at the collegiate level need to consider how to provide support to food-insecure students through programs that provide sustenance and cultivate their BPN, which will help them avoid detrimental habits that will ultimately limit their learning, their present well-being, and future well-being.

Food Insecurity and Chronic Disease

Since some chronic diseases are known to develop in young adulthood, Nagata et al. determined it was important to consider if there was a relationship between chronic diseases and food insecurity (2019b). The diseases compared to food insecurity in this study were: “diabetes, hypertension, hyperlipidemia, and “very overweight”” (Nagata et al., 2019b). The “cross-sectional nationally representative data from Wave IV (2008)” from the National Longitudinal Study of Adolescent to Adult Health was utilized to create a healthy sample size of participants

ranging from 24-32 years of age (Nagata et al., 2019b). Multiple logistical regression was the method of choice for Nagata and his team to effectively and efficiently determine if there was, in fact, a relationship between chronic diseases and food insecurity. Out of the 14,786 participants in the cross-sectional data, 2,071 (11%) were afflicted with food insecurity (Nagata et al., 2019b). Unsurprisingly, participants with food insecurity were found to have greater odds of having poorer health than their peers ("2.63, 95% CI 1.63 - 4.24") (Nagata et al., 2019b). For example, food insecure young adults had 1.67 odds of having diabetes ("1.67, 95% CI 1.18 - 2.37"), 1.40 odds of having hypertension ("1.40, 95% CI 1.14 - 1.72"), 1.30 odds of being "very overweight" ("1.30, 95% CI 1.08 - 1.57"), and 1.48 odds of having obstructive airway disease ("1.48, 95% CI 1.22 - 1.80") in comparison to those who are not food insecure (Nagata et al., 2019b).

Chronic Negative Emotions, Stress, and Cortisol

It is commonly known that food-insecure students deal with chronic negative emotions and stress due to their limited availability of food (Alessandri et al., 2021). The need for sustenance even affects sleep patterns for these students (Nagata et al., 2019c). Therefore, it is important to examine how these particular chronic issues affect the physical functions of a student experiencing food insecurity (Laska et al., 2021; Meza et al., 2019; Nagata et al., 2019c; Silva et al., 2015; Zein et al., 2019). A study conducted by Alessandri et al. (2021) explored this very thing by collecting data with the intent of determining if there are any "associations between" predictable and unchanging negative emotions, also known as negative emotional inertia and cortisol. To do so, 18 salivary samples were personally collected by the participants (n=76) throughout the 3-day study to measure the cortisol levels in each person's passive drool throughout the allotted time period. Furthermore, each participant was required to fill out fifteen 10 item

Likert scale artifacts with each of the ten items formulated from the “Positive and Negative Affect Schedule” (Alessandri et al., 2021). They were also asked to journal their experience of “mood, stressful events, caffeine, alcohol, medication and nicotine use, food intake, exercise, and sleeping behavior in the prior hour” before each salivary sample taken as a means of considering momentary covariates (Alessandri et al., 2021). “Person-level” Covariates were also taken into consideration when measuring the cortisol levels of patients (Alessandri et al., 2021). These covariates were “sex, race/ethnicity, parent's average education level, and oral contraceptive use” (Alessandri et al., 2021). The sample of participants consisted of students with “a mean age of 18.53 (SD = 0.37)”, and 76% being female. Additionally, the sample was racially diverse with 54% being “Non-Hispanic White”, 16% being either Hispanic or Latin descent, 4% being African American, and 26% being “multiple race/other” (Alessandri et al., 2021). The parents’ level of education for the sample was well spread out, with “3.7% of parents completing some high school, 26.8% having a high school diploma or GED, 23.2% having some college, 11% having an associate’s degree, 18.3% having a bachelor’s degree, and 17.1% having a graduate degree (Alessandri et al., 2021). By using a hierarchical linear model, the researchers were able to determine the cortisol awakening response (CAR) was “significantly and negatively predicted by negative emotional inertia (B=-0.95, {95% C.I., -1.27, -0.64}. SE=0.16, p<.00) (Alessandri et al., 2021). In addition to this finding, the covariate of parental education was negatively associated with the area under the curve for glucose (AUCg) “(B=− 1.23**;{− 2.01,− 0.40},SE=− 0.01,p=.01)” and the diurnal cortisol slope (DCS) “(B = − 0.01**; {− 0.02, − 0.01}, SE =0.00, p = .00)” (Alessandri et al., 2021). These results indicate that students who have parents with more education “had lower overall cortisol levels and steeper slopes across the day” (Alessandri et al., 2021). Concerning a student’s perception of stress and its effect on CAR, Area Under the Curve

with respect to the ground (AUCg), and daily cortisol level (DCS) were all significant. For CAR, perceived stress was a "significant predictor" "(B=− 0.03, {95% CO, − 0.10, − 0.14}. SE=0.00, p < .00)" while AUCg "(B = − 0.03, {95% CO, − 0.10, − 0.14}. SE=0.00, p = .01)" and DCS were "significantly associated" with perceived stress (Alessandri et al., 2021). However, it should be noted that the researchers emphasized that the perceived stress of a participant did not change the results of "NE inertia and average NE" and its prediction of "diurnal cortisol parameters" (Alessandri et al., 2021). At the end of the study, Alessandri et al. were able to conclude that chronic negative emotions affect a student's ability to deal with stressors (2021). This is due to the fact that normal daily cortisol patterns are blunted "from long-term chronic activation", meaning a person's stress hormone levels do not follow the proper peaks and troughs in the morning, throughout the day, and at night while they are sleeping (Alessandri et al., 2021). Furthermore, the hypothalamic-pituitary-adrenal axis (HPA axis) is "underactive" from the allostatic load, meaning a person's hypothalamus, pituitary gland, and adrenal gland no longer respond to stressors like they should due to constant stimuli that induce stress (Alessandri et al., 2021). Since this is the case, a student's poor cortisol function will result in poor long-term physical health from inappropriate stress hormone response in moments of need (Alessandri et al., 2021).

Nutrition and Academic Success

Nutrition plays a vital role in each person's development and academic achievement. When a person consistently has a well-balanced diet, their potential to grow and complete school requirements is at its peak (Araujo et al., 2014; Correa-Burrows et al., 2016; Hagedorn & Olfert, 2018). However, that is not the case when a person's diet is poor. In a predictive study with 395 sixteen-year-old Chilean students (16.8 avg. age, SD: .03), Correa-Burrows et al. (2016) and her team decided to determine the effects of poor diet on student academic success. The sample of

the study was 52% female, with the types of schools they attended being high school (36%), vocational high school (54%), and adult school (10%) (Correa-Burrows et al., 2016). To understand the diet status of students, the team gave each student a "validated food frequency questionnaire" to determine the amount of fat, fiber, and salt in their diets (Correa-Burrows et al., 2016). The higher the number of calories and the frequency of meals with high "fat, sugar, or salt" content would indicate how unhealthy a participant's diet is (Correa-Burrows et al., 2016). The results showed that "17% of the participants had an unhealthy diet", "50% had fair dietary habits", and "33% had a healthy diet" (Correa-Burrows et al., 2016). After gleaning this data, it was compared with each student's grades. Consequently, the results showed that an unhealthy diet decreased a student's potential in academic achievement with significant decreases in mathematics "(OR: 0.42; 95% CI: 0.19–0.88)", language "(OR: 0.40; 95% CI: 0.18–0.89)", and GPA "(OR: 0.26; 95% CI: 0.11–0.61)" (Correa-Burrows et al., 2016). Similarly, other studies in this section will contrast how long-term, intermittent, and short-term malnutrition and food insecurity will temporarily stunt a person's academic success and, in severe cases, permanently hinder a person's academic potential. (Christian & Dillon, 2018; Hannum & Hu, 2017; Waber et al., 2014). Therefore, food-insecure college students must receive healthy meals that provide adequate sustenance in a timely manner. By doing so, they can overcome their academic handicap and get back on pace with their peers (Hagedorn & Olfert, 2018; Hannum & Hu, 2017).

A College Student's Diet When Experiencing Food Insecurity

With data gleaned from a Qualtrics survey originally used for a "sugar-sweetened intervention study", Mei et al. (2020) were able to examine the results of 1,033 students who answered questions from the "6-item Short Form Food Security Survey Module" as well as the Na-

tional Cancer Institute's "26-item Dietary Screener Questionnaire" and "Beverage Intake Questionnaire- 15". With this existing data, Mei et al. were able to examine the food security status of students and compare it with their dietary and beverage intake with "generalized linear regression models" (2020). The research team found that students who fell under the classification of food insecure had lower food intakes of vegetables (9%), fruits (9%), fiber (4%) and higher food intakes of dairy (10%), total added sugars (6%), calcium (4%), and "added sugars from sugar-sweetened beverages" (10%). Furthermore, it was found food insecure students had higher beverage intakes of fruit drinks (55%), energy drinks (148%), sweetened teas (129%), flavored milk (46%), sugar-sweetened beverages (54%), and diet soda (66%) (Mei et al., 2020). These results indicate students with food insecurity, even with "similar access" to food on a college campus, had ingested different types of food compared to those who were food secure (Mei et al., 2020). Therefore, the research team made the recommendation to "increase food insecurity awareness" and encourage college administrators to contribute funding towards programs like food pantries to "alleviate food insecurity" (Mei et al., 2020).

Food Insecurity and Academic Success

Hagedorn and Olfert's quantitative study to determine the effects food insecurity had on student GPA, "coping strategies", financial decisions, and academic progress were all statistically significant (2018). Between students with food insecurity and those without, the average GPA for students with food insecurity (n=253) was 3.33 with one standard deviation of .03 grade points, while the average of food secure students (n=439) was 3.51 with a one standard deviation of .02 grade points (Hagedorn & Olfert, 2018). Concerning the metric on coping strategies and financial decision-making, it was found that food-insecure students had higher odds (2.07) of

purchasing non-food items and paying for housing over needed sustenance to continue their persistence toward academic success (Hagedorn & Olfert, 2018). In addition to these statistical findings, the authors discovered that food insecurity becomes a less prevalent issue as students continue to pursue their college degrees within the Appalachian region. For example, the odds ratio of a freshman being food insecure was found to be 2.85, while the odds ratio for seniors to be classified as food insecure drops to a ratio of 1.75 (Hagedorn & Olfert, 2018).

Food Insecurity Among American College Students and Their GPA

Similarly, a "multi-institutional" study conducted by Zein et al. (2019) in the United States confirmed that food insecurity did affect a student's GPA ($p < 0.001$) (2019). By conducting a convenience sampling model, the research team was able to get 1,331 students from eight universities to interact with their surveys. The participants were predominately female at 68.8%, and 65.4% were 19 years old (Zein et al., 2019). Additionally, 62.4% of the participants were "non-Hispanic white, and 43% were employed at the time they participated in the surveys. To control for "age, sex, race/ethnicity, parental education, meal plan enrollment, employment status, place of residence, and Pell grant status", Zein et al. utilized multivariate logistic regression analysis (2019). By doing so, the research team was able to accurately measure the effect food insecurity has on a student's risk of earning a GPA lower than 3.00. Unsurprisingly, it was found that students who were categorized as food insecure had almost twice the risk of earning a GPA lower than 3.00 (Zein et al., 2019). The research team also found that food insecurity created psychological challenges among students. The most notable challenges were: "fatigue, anxiety, sleep deprivation, and physical weakness" (Zein et al., 2019). The research team hypothesized these would "impair" a student's ability to concentrate in the classroom (Zein et al., 2019).

Food insecurity, psychosocial health, and academic performance

A longitudinal study by Raskind et al. was conducted in 2019 to determine if a student's psychosocial health "mediates the association between food insecurity and GPA". The participants in this study consisted of 2,377 students between the ages of 18-25 from the state of Georgia (Raskind et al., 2019). Over a two-year period, the students were given surveys every four months to determine their current status in GPA, food insecurity, and psychological well-being (Raskind et al., 2019). At the conclusion of the study, it was found that psychosocial health is, in fact, associated with food insecurity (-0.02, 0.03, $p < 0.0001$), and it is a mechanism that affects a student's GPA (Raskind et al., 2019). This was confirmed by the results of the study with "food security status on GPA, mediated with psychosocial health," as statistically significant (-0.05, 0.01, $p < 0.0001$) while "food security status on GPA" was not statistically significant when psychosocial health was taken into account (-0.02, 0.02, $p = 0.43$) (Raskind et al., 2019). The results of this study affirm Maslow's Hierarchy of Needs as well as the Self-Determinations Theory, in that a student's food insecurity, a lower tier need, will affect their psychosocial health; a higher tier need, which is also essential for developing a healthy BPN.

Food insecure student's health, dietary intake, mental health, and focus

In 2016, a convenience sample study with 58 food-insecure college students in the province of Alberta, Canada, had similar findings to Hagedorn and Olfert's work (Farahbakhsh et al., 2016). The results also concluded academic success and behavior toward purchasing food in this student population are hindered because of limited resources (Farahbakhsh et al., 2016; Hagedorn & Olfert, 2018). However, the study also determined that students with severe food insecurity had greater odds of having poor physical and mental health, poor dietary intake, and "poor

healthy food diversity" (Farahbakhsh et al., 2016). Furthermore, the research team's results indicated students within this classification had a very difficult time focusing during class lectures and test-taking sessions (Farahbakhsh et al., 2016). These findings are another representation of what can happen to food-insecure students. Other aspects of their life begin to deteriorate, and consequently, their academic life begins to take a toll. Therefore, it is paramount that institutional leaders consider utilizing food programs and formulating effective approaches for meeting the physical needs of food-insecure students.

Malnourished student academic response to nutrition

Due to the limitation of studies with college-age students and their academic response to positive nutrition, studies with young children and high schoolers, both in the United States and internationally, will be explored to gather an idea of what is possible with nutritional intervention programs. In one longitudinal and "random/fixed" quantitative study with 1,867 nine to twelve-year-old Chinese students, Hannum and Hu found that chronic and short-term hunger negatively affected a student's academic ability (2017). This finding was determined by utilizing the height-for-age z score (HAZ), developed by the World Health Organization (WHO), for chronic undernutrition (Hannum & Hu, 2017). On the other hand, the researchers utilized two "indirect methods" for short-term hunger (Hannum & Hu, 2017). The first was asking students if they were hungry, and the second method of measurement was cataloging whether a student had eaten meals provided by the school that day (Hannum & Hu, 2017). These measurements were compared with the results of multiple behavior scales like the "Standardized Externalizing and Internalizing Behavioral Problems" as well as literacy scores, a student's persistence to continue education, prior school achievement, a student's demographic background, and a student's socioeco-

nomic background (Hannum & Hu, 2017). Fortunately, the duo found that these students responded positively to feeding and supplemental programs provided by the schools they attended. There was identifiable improvement in their academics; they were more participative, less troublesome, and they were able to catch up with their peers (Hannum & Hu, 2017).

Results from a school breakfast program. A similar quantitative study conducted in South Africa by Hochfield et al. (2016) discovered that elementary and middle school's provision of a healthy breakfast every morning decreased the percentage of severely malnourished students in the district from "7.5% to 2.8%". However, unlike the findings Hannum and Hu had in China, there were no statistically significant changes in this population's academic performance (Hochfield et al., 2016). Nevertheless, it was found through interviews with school faculty and students that school attendance increased, students were more alert throughout the day, and they were able to think more clearly when given a task to complete. These results indicate that a school or university can increase food insecure student retention by eliminating their need to find food (Hochfield et al., 2016; Silva et al., 2015).

Quality snacks, academic achievement, and enrolling in higher education

In a cross-sectional study led by Correa-Burrows et al., the snacking of 687 high school students in Chile was examined as each strove to earn quality GPAs and high school diplomas and considered pursuing higher education (2016). Unsurprisingly, those who ate nutritional snacks at home and on campus were on excellent trajectories. In all categories of examination, they were performing at the top of the study. However, students who were eating nutritionally poor snacks had lower GPAs ("a mean difference of -40.1 points") and were 47% less likely to take college entrance exams (Correa-Burrows et al., 2016). Unlike the results found by Hochfield

et al., this study agrees with the findings of Hannum and Hu. Students who receive proper nutritional sustenance will properly respond and achieve greater heights in their learning (Correa-Burrows et al., 2016; Hannum & Hu, 2017).

Seasonal nutrition and academic attainment

During dry seasons in underprivileged nations, students deal with food shortages and can move from the classification of healthy to malnourished. Fortunately, when the wet season returns and the harvest is reaped, they can get back to a weight that is considered healthy. However, there are repercussions for having an inconsistent diet throughout the year (Christian & Dillon, 2018). During a quantitative longitudinal study in Tanzania, Christian and Dillon found that individuals who experienced seasonal malnutrition over a twenty-year period showed a small decrease (2%) in height and educational attainment (Christian & Dillon, 2018). Their results were not overtly significant. However, the researchers claim that this low percentage may be due to the fact that seasonal drought periods in Tanzania are less severe than in other parts of the world. For example, in locations where the drought periods were extremely severe, like Guatemala, it was found the decrease in height and academic attainment of a desired diploma or degree would reach as high as 14% (Christian & Dillon, 2018). Therefore, if a person's diet violently fluctuates during their lifetime, they will more likely receive permanent damage to their physical health, mental health, and academic potential (Waber et al., 2014).

Nutrition and Cognition

It is commonly known that a person's ability to think is affected by hunger (Hagedorn & Olfert, 2018; Wattick et al., 2018). This is especially true when the nutrition a person receives does not provide proper sustenance for the brain (Portillo-Reyes et al., 2014). Therefore, severe malnutrition during childhood can permanently damage a person's brain and hinder their ability

to cognitively function at the same level as other individuals their age (Araujo et al., 2014; Waber et al., 2014). In adulthood, poor cognitive nutrition will also cause individuals to experience mental challenges (Wattick et al., 2018). Therefore, studies on nutrition's effect on cognition will be explored.

Infant malnutrition and future cognition

In two longitudinal quantitative studies, Araujo et al. and Waber et al. found that severe malnourishment in infancy and early childhood affected adult cognition (Araujo et al., 2014; Waber et al., 2014). To come to this conclusion, IQ and cognitive tests were used to determine the ability in each subject. After getting each subject's results, they were compared with current anthropometrics as well as historical data gathered during youth. Consequently, it was discovered that both studies found statistically significant data concerning this phenomenon (Araujo et al., 2014; Waber et al., 2014). Therefore, the adults who had a history of severe malnourishment during infancy were classified as intellectually disabled in these studies. Interestingly, both studies occurred in two separate parts of the world. Araujo et al. conducted their study in Brazil with 12,997 subjects, while Waber et al. worked with 136 indigenous people in the nation of Barbados (Araujo et al., 2014; Waber et al., 2014). Therefore, both studies' findings seem to indicate that these results may be common around the world.

Omega-3 Supplement's effect on cognition

While some individuals are challenged with lifelong disabilities from malnutrition, supplements can be used to improve the current cognition of students no matter their condition (Araujo et al., 2014; Waber et al., 2014). In a quantitative, "randomized, double-blind, treatment and placebo" study conducted by Portillo-Reyes et al., it was found that over 50% of the 59 impoverished students participating showed cognitive improvement by taking an omega-3 fatty

acid supplement (2014). Out of the ones that had improved cognition, they showed improvement in 11 of the 18 criteria used in the test measuring their cognition (Portillo-Reyes et al., 2014). Furthermore, the researchers found that students had increased "processing speed, visual-motor coordination, perceptual integration, attention and executive function" (Portillo-Reyes et al., 2014). Therefore, universities and schools should consider implementing a program that provides students with supplements that improve cognitive function, such as omega-3 supplements (Hannum & Hu, 2017).

Nutrition and mental health in college students

After finding that supplements can improve cognition in malnourished middle-school students and that proper diet helps high school students improve academic achievement, an attempt to determine the value of nutrition in college students was explored (Correa-Burrows et al., 2016; Portillo-Reyes et al., 2014). In a quantitative study conducted by Wattick et al., it was found that the mental health and well-being of college students could be determined by their diet (2018). For example, students found to be food insecure or students who ate unbalanced meals in the study exhibited depression. Furthermore, male students would exhibit anxiety when their limited diet had more sugar in it. Therefore, students experienced added stressors in their lives because of poor dietary practices (Silva et al., 2015; Wattick et al., 2018). However, the study found this could be overcome by limiting sugar intake, eating consistent meals, and eating more fruits and vegetables (Wattick et al., 2018).

Summary

Poverty, malnutrition, and food insecurity regularly affect college students in the third-world and developing nations. Unsurprisingly, there is a small percentage of college students in the United States affected by hunger and poor living conditions (Silva et al., 2015). Fortunately,

researchers have taken notice of this population and have taken the initiative to help. Through interviews, surveys, questionnaires, and studies, it was found that a university's intentionality toward these students makes a significant difference in attendance and achievement (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015). Unfortunately, very little research has been conducted on the effects of college student food insecurity and their BPN. While it is true articles have addressed the effects of diet on a college student's mental health, and others have discussed food insecurity's effect on student GPA, academic focus, and anticipated academic growth, there are few articles that directly address diet, academic learning, and BPN (Wattick et al., 2018). Rather, studies on malnutrition in children and chronic cases in adults were examined to better understand the academic achievement and cognitive abilities of those affected by food deprivation. Unsurprisingly, it was found that inconsistency in nutrition affected academic achievement in children and could be easily remedied through feeding programs (Hannum & Hu, 2017). In adults that had stunting and brain damage from malnutrition, they were found to have learning disabilities well into their forties (Waber et al., 2014). However, the information provided in these articles still did not address how to increase the BPN of students with food insecurity.

Since there was no conclusive evidence on whether there is a correlation between food insecurity and a student's BPN, a clear gap has been identified. Therefore, it is vital that research is conducted to fill the gap in existing literature. Subsequently, this study will conduct empirical research to improve the literature and provide the necessary information for a better understanding of this student population. In addition to this, the study will provide vital information for future initiatives aiming to meet individual needs within this population.

CHAPTER 3: METHODOLOGY

Overview

This study strives to determine whether there is a predictive relationship between collegiate students' food insecurity and Basic Psychological Needs (BPN). Appropriate design will be utilized to answer the following query: "Is there a predictive relationship between food insecurity and student competency, autonomy, and relatedness satisfaction while attending a post-secondary school?" In this chapter, the design, instrumentation, and procedures will be clearly explained. The study setting and participants will be described, and data analysis will be discussed.

Design

A quantitative, correlational design with a convenience sample will be used for this study. The value of this design is that it allows the researcher to "measure a great number of variables and their interrelationships simultaneously" (Gall et al., 2007, p. 477). Furthermore, it provides the researcher with the ability to see "how several variables, either singly or in combination, might affect a particular pattern of behavior", and it provides a "degree of relationship between the variables being studied" (Gall et al., 2007, p. 478). By having this ability, the researcher will be able to determine the extent of the relationship between a student's food insecurity, the independent variable, and their BPN, which consists of autonomy satisfaction, competence satisfaction, and relatedness satisfaction (the three dependent variables) and understand the degrees of relationship (Gall et al., 2007). It should be noted that correlational studies cannot provide proof of cause-and-effect relationships; rather, they can only provide whether a relationship exists and the strength to which it exists (Gall et al., 2007).

The top rationale for using this particular design is to clarify the relationship between food insecurity and BPN. Predictive designs are particularly useful to determine how one variable predicts another (Gall et al., 2007). For example, determining whether there is a predictive relationship between food insecurity, the independent variable, and competency satisfaction, autonomy satisfaction, and relatedness satisfaction (the dependent variables), all of which help measure a student's BPN, will be immensely helpful in determining how strong a student's food insecurity predicts each aspect of their ability to learn.

Research Questions

RQ1: Can food-insecurity predict student autonomy satisfaction in post-secondary institutions?

RQ2: Can food-insecurity predict student competency satisfaction in post-secondary institutions?

RQ3: Can food-insecurity predict student relatedness satisfaction in post-secondary institutions?

Null Hypothesis

$H_0$1: There is no significant predictive relationship between food-insecurity and student autonomy satisfaction in post-secondary institutions.

$H_0$2: There is no significant predictive relationship between food-insecurity and student competency satisfaction in post-secondary institutions.

$H_0$3: There is no significant predictive relationship between food-insecurity and student relatedness satisfaction in post-secondary institutions.

Participants and Setting

For this study, community, public, and private colleges in the state of Florida will be selected to draw the necessary convenience samples. Specifically, students will be asked to participate in the study halfway through the spring semester in the school year of 2022-23, and students within these same institutions will be asked to participate within the last week of the spring semester to collect data again. The overall population of these students is estimated to be 13,000. It should be noted that this study will be open to any college student, regardless of their academic status or degree pursuit. They simply have to officially attend one of the higher education institutions that will be selected for the study.

New student data from locations newly familiar to the researcher will be used for the current study. Consequently, a non-probability sampling method, convenience sampling, will be used. This method, well known for gathering data quickly with fewer planning steps and procedures, will allow the researcher to have any willing participant access the survey for data collection online (Gall et al., 2007). It will also help the researcher during the recruitment process of institutional leaders because there will be less work required from them if they are to participate. This means willing available freshmen and sophomores will participate in the study from the community colleges while freshman through seniors will follow suit at the public and private universities. The selected minimum number for this study is 200 students, which greatly exceeds the minimum sample size of 66 necessary students for a medium effect size and statistical power of .7 when the alpha level is at .05, as stated by Gall et al. (2007). This study will also aim to recruit an additional 76 subjects to allow for potential incomplete data forms to be eliminated.

The gender spread of this study's sample is 45 males, 144 females, and 4 participants reporting as "other". There were also 28 eighteen years olds, 50 nineteen year olds, 41 twenty year

olds, 33 twenty-one year olds, 26 twenty-two year olds, and 15 older than twenty-two year olds. The ethnicity spread of those within the sample is 101 Caucasian, 27 African American, 52 Hispanic, 5 Asian, and 8 identifying as other. The annual income of students, or their families, in the sample were 42 $0 - $20,000, 40 $20,000 – $40,000, 32 $40,000 - $60,000, 26 $60,000 – $80,000, and 53 $80,000 or greater. Student academic year status in the sample is 31 freshman, 55 sophomore, 53 Junior, 53 Senior, and 1 post-graduate.

Instrumentation

The Food and Agriculture Organization of the United Nations (FAO) has made the Food Insecurity Experience Scale (FIES) available to the public for use. Therefore, seeking permission was not necessary, and it will be utilized to determine each participant's food availability and to what severity they are affected by their circumstances (FAO, 2020). The FIES scale has been the accumulation of research, studies, and adapted tools developed by the Voices of the Hungry for the last twenty years (FAO, 2020). During this time, the Voices of the Hungry also "developed analytical protocols" necessary for the FIES to be used universally that would allow the results to be compared with prevalence rates no matter the location or participants in each study (FAO, 2020). Examples of Voices of the Hungry achieving this goal and the FIES's legitimacy began in the year 2014 due to researchers with Gallop® World Poll collecting and measuring data throughout 146 countries (Cafiero et al., 2018; FAO, 2020; Smith et al., 2017; & Wambogo et al., 2018). The data points from roughly 1,000 participants in each country were analyzed separately in an effort to determine the scale's validity in each ethnic and cultural context (Cafiero et al., 2018). The results from each of these studies proved validity for 79% of the countries being analyzed with a Rasch reliability between .70 and .80 (Cafiero et al., 2018).

The United States was one of the countries that fell within the category of having the FIES scale carry a Rasch validity greater than .70, and the scale itself has a Cronbach's α of .927, which is greater than the minimum requirement of .70 to show reliability (Cafiero et al., 2018; Elena & Alessia, 2020). The FIES scale has a total of eight questions to help the researcher determine a participant's food insecurity (Cafiero et al., 2018; Wambogo et al., 2018). To accomplish this, each question on the scale progressively aids the researcher in understanding the severity of one's food insecurity over a 12-month period through a dichotomous Item Response Theory (IRT) design (FAO, 2020). Therefore, the instrument uses these eight yes/no questions, with the first question asking, "Were you worried you would not have enough food to eat?" and the last question asking, "Did you go without eating for a whole day?" (FAO, 2020). Depending on how many yes responses the participant gives and what questions they answer yes to, they will be given a number for reference on the FIES, which will be 0 = Food secure, 1 = mild Food insecurity, 2 = Moderate food insecurity, 3 = Severe food insecurity. If they answer yes to less than four of these questions, and they are questions 1, 2, and 3, they will be classified as having mild food security (1). If participants answer yes to more than three questions but less than seven and answer yes to questions 4, 5, and 6, they will be classified with moderate food insecurity (2). Finally, if participants answer yes to seven or more questions, and two of them are questions 7 and 8, they will be classified with severe food insecurity (3). The length of time necessary to complete the FIES scale varies between two to five minutes for participants, as stated by the FAO, and it is recommended that participants are either interviewed by the researcher or are given a paper or digital version that they can complete themselves (FAO, 2020).

Basic Psychological Needs Satisfaction and Frustrations Scale (BPNSF)

To determine the BPN of each student, the BPNSF Scale will be utilized. The scale will measure a student's competence satisfaction, autonomy satisfaction, and relatedness satisfaction in their post-secondary institution with a numerical result. Each has been effective within their respective designs and has been proven through several studies to be valid with one another (Assor et al., 2002; Black & Deci, 2000; Rojas et al., 2012; & Williams & Deci, 1996). For example, the Perceived Competence Scale (PCS) has received an alpha level of .80 or higher internal consistency (Black & Deci, 2000; & Williams et al., 1998). This internal consistency has been determined through diverse studies that have had participants managing their glucose levels to students learning material in an interviewing course (Black & Deci, 2000; & Williams et al., 1998). Similarly, the Learning Self-Regulation Questionnaire (SRQ-L) has a reliable alpha of .75 for the controlled regulation subscale and a .80 alpha reliability for its autonomous regulation subscale (Black & Deci, 2000; Ryan & Deci, 2000, 2016; & Williams et al., 1998). These results have been affirmed with studies ranging from multiple longitudinal studies measuring medical students' autonomy as they participated in interviewing courses to comparing student's organic chemistry grades and with their measured autonomy (Black & Deci, 2000; Ryan & Deci, 2000, 2016; & Williams et al., 1998).

When taking the results from these studies and merging them together, Chen et al. (2014) strove to determine if a participant's overall BPN could be measured with all three together in the formed BPNSF scale. It was accomplished by checking the BPNSF strength in China, the USA, Peru, and Belgium (Chen et al., 2014). When examining the structural equivalence using the constrained 6-factor model, they were able to conclude that "SBS X^2 (18) = 27.74, CFI = 0.99, RMSEA = 0.06, SRMR = 0.02, and the unconstrained model did not yield a superior fit

($\Delta X^2(18) = 27.74$, p [0.05)" (Chen et al., 2014). Furthermore, the CFA of their research had an acceptable fit with "SBS- $X^2(1,597) = 2,615.63$, CFI = 0.90, RMSEA = 0.05 and SRMR = 0.08" with the participants of all four nations taken into consideration (Chen et al., 2014). Finally, Cronbach's α for autonomy (.77), relatedness (.72), and competence (.77) in the BPNSF were above .70, indicating all aspects of the scale are reliable. Therefore, it is confirmed the BPNSF carries great factor strength together, and each scale carries validity and reliability separately, indicating the BPNSF is the ideal scale for measuring participants' BPN.

The design of this instrument is a five-point Likert scale that ranges from not true at all to very true. Responses are as follows: Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly disagree = 1. There are a total of 24 statements/questions for students to respond with four questions pertaining to each of the six subscales. Some of the statements for the subscales are as follows: "I will participate in academics because I would feel proud of myself if I did well.", "I feel confident in my ability to learn this material.", and "I feel able to meet the challenge of performing well in." (Black & Deci, 2000; & Williams et al., 1998). After all 24 statements/questions are answered, the items pertaining to autonomy satisfaction and frustration, relatedness satisfaction and frustration, and competence satisfaction and frustration will be separated and scored (Van der Kaap-Deeder et al., 2020). The greatest a participant can score in each of these areas is 20, and the lowest is 4. Shortly after collecting these totals, a composite score will be calculated from this amount, and this will give the researcher a definitive answer of the participant's autonomy, relatedness, and competency pertaining to their academics (Van der Kaap-Deeder et al., 2020). The recommended way a participant is to complete this scale is either on paper or on computer for ease of use with the statements/questions provided in a manner that is well mixed so that the results will be sullied (Van der Kaap-Deeder et al., 2020). The expected

time for a participant to complete the scale is four to six minutes. It should also be noted that "all academic use is permitted" for this scale due to the creators' decision to make this scale available to researchers involved in educational research ("Basic Psychological Need Satisfaction", n.d.). Therefore, the BPNSF scale will be used legally in this education-oriented study.

Procedures

During the Spring of 2023, the researcher will develop a survey on SurveyMonkey, with the goal of giving a hyperlink to school leaders who will invite students to participate in the study, while seeking academic approval, for the school year of 2022-23, with Liberty University's Institutional Review Board (IRB). Before receiving IRB approval, permission from administrative leaders at the community, public, and private institutions in the state of Florida will be sought with the hope of gaining approval to collaborate with leaders before the start of the 2022-23 spring semester. If permission is granted, the researcher will sit down with each leader to explain the goal of the study, the scales being used, and how students can be encouraged to participate in the study. Furthermore, the researcher will walk each leader through the process of how to access the study's set of questions and statements on SurveyMonkey's website so they are able to inform students on how to do the same, as well as how they can help students troubleshoot any difficulties they may face. During the spring semester, these leaders will encourage their students to participate in the study during the second week and second to last week of school via a link received through email. After 200 or more students have completed the study and used their student ID within it to identify themselves and retain anonymity, the researcher will collect the data from the web-based portal, download it onto a computer and password encrypt it for security purposes, upload it into SPSS when it is appropriate to conduct analysis, and interpret the results for the study. If less than 200 students participate in the study, a second data

collection period will occur shortly after at one or more new institutions, depending on how many more participants are needed, where the researcher and the leadership have already come to an agreement for the unlikely possibility this will occur.

Data Analysis

Since this study seeks to understand whether there is a predictive relationship between food insecurity and a college student's BPN, there are multiple variables needing accurate mathematical interpretation and direct independent examination between the predictor variable and each criterion variable. Therefore, bivariate regression will be used to determine whether the FIES scale results can predict a student's BPN, which is a student's level of competency, autonomy, and relatedness satisfaction (Adams et al., 2017; Gall et al., 2007). Therefore, when seeking to determine if the first, second, or third null hypothesis is rejected and there is collinearity, there will need to be at least a correlation coefficient of .74, or greater, between the aforementioned predictor variable and the criterion variables of autonomy, competency, and relatedness (Gall et al., 2007).

Data Screening

After collecting data from the study, a visual analysis will be conducted as the data is being transferred from the Survey Monkey website to SPSS to ensure the data is entered correctly and there is no missing data from survey entries received from participants. If there are any missing data points from a particular survey, the survey will be rejected. In addition to determining if there is any missing data, there will be an intentional search for any extreme outliers that are outside of the expected parameters with the use of box and whisker plots. If one of the subscale's scores is an outlier, that subscale's score will be omitted (Gall et al., 2007). Finally, the data

points will be compared using bivariate regression between the two sets of data, ensuring the questions on the survey were clear and understood (Gall et al., 2007).

Data Assumptions Testing

Assumptions testing will be conducted, following data screening and inputting the raw data into SPSS's database to determine whether there are any existing violations that would hinder or skew the results of this study (Denis, 2016; Gall et al., 2007). Therefore, the assumption of bivariate outliers, assumption of linearity, and assumption of bivariate normal distribution will be utilized to ensure the bivariate regression algorithm is not compromised. The assumption of bivariate outliers will require that the predictor variable, food insecurity, is placed on the three separate scatter plots with each criterion variable to determine if there are any extreme bivariate outliers. These scatter plots will also be used in the assumption of linearity to ensure there is a positive or negative linear relationship between the predictor variable and the criterion variables and that there is no parabolic relationship. Finally, the assumption of bivariate normal distribution will utilize these same scatterplots to determine if the predictor variable and criterion variables create a classic cigar shape, which would indicate a normal distribution of data (Denis, 2016; Gall et al., 2007).

Statistical Analysis

At the conclusion of collecting the raw data, screening it, and ensuring each aspect of assumptions testing is passed, the information within SPSS's database from the surveys will be examined with bivariate regression to determine if there is a predictive relationship between food insecurity, the predictor variable, and autonomy, competency, and relatedness, the criterion variables. Since there are three tests of significance, a Bonferroni correction will be utilized. Therefore, this study will be operating with an alpha level of .05/3= .017. The results will be compared

to the alpha and confidence level to determine if they in fact reject each null hypothesis and indicate a predictive relationship (Denis, 2016; Gall et al., 2007). By clicking on the analyze button on the menu bar within the SPSS program and selecting regression with a linear sub-selection, the data points for the predictor variable and the multiple criterion variables will be mathematically engaged, and three resulting output tables will appear. The first box is the model summary that provides Pearson's *r*, which will inform the researcher of the degree of correlation food-insecurity, the independent variable, has on student autonomy, competency, and relatedness, the dependent variables. Additionally, the r^2 found on the model summary provides the researcher with an accurate explanation of how much the "total variation in the dependent variables" "can be explained by the independent variable" ("We Make Statistics Easy", 2018). The second one is the ANOVA table, where the "statistical significance of the regression model" can be found and will be used to determine whether the regression model can statistically and significantly predict "the outcome variable" ("We Make Statistics Easy", 2018). Furthermore, it provides the *F* statistic that is necessary for determining whether the null hypothesis should be rejected ("We Make Statistics Easy", 2018). Lastly, the coefficients table informs the researcher of how coefficients change with the input data ("We Make Statistics Easy", 2018). It also provides the researcher with "the information to predict" autonomy, competency, and relatedness from food insecurity. This information can then be organized to formulate a regression equation, assuming the results are statistically significant, to predict a college student's autonomy, competency, and relatedness ("We Make Statistics Easy", 2018).

CHAPTER FOUR: FINDINGS

OVERVIEW

The purpose of this study was to determine if a college student's Food Insecurity (FI) status can predict their Basic Psychological needs (BPN), which consist of autonomy, relatedness, and competency satisfaction. The criterion variables were autonomy, relatedness, and competency satisfaction. The predictor variable was Food Insecurity. Three bivariate linear regressions were run to test the three null hypotheses. This Findings chapter includes the research question, null hypothesis, data screening, descriptive statistics, assumption testing, and the results of bivariate linear regressions.

Research Questions

RQ1: Can food insecurity predict student autonomy satisfaction in post-secondary institutions?

RQ2: Can food insecurity predict student relatedness satisfaction in post-secondary institutions?

RQ3: Can food insecurity predict student competency satisfaction in post-secondary institutions?

Null Hypotheses

$H_0$1: There is no significant predictive relationship between food-insecurity and student autonomy satisfaction in post-secondary institutions.

$H_0$2: There is no significant predictive relationship between food-insecurity and student relatedness satisfaction in post-secondary institutions.

$H_0$3: There is no significant predictive relationship between food-insecurity and student competency satisfaction in post-secondary institutions.

Descriptive Statistics

Table 1 includes the mean and the standard deviation for each variable.

Table 1

Descriptive Statistics for All Variables

Variable	*n*	*M*	*SD*
FI Status	193	2.58	2.57
Autonomy Satisfaction	193	3.76	.70
Relatedness Satisfaction	193	3.73	.87
Competence Satisfaction	193	4.07	.75

Results

Data Screening

Data screening was conducted on all variables. The researcher examined the data set for missing data points and inconsistencies. It was found that five participants failed to complete the questionnaire, which resulted in missing data points and inconsistencies. Therefore, they were removed to ensure the results were not sullied.

Assumption Testing

A bivariate linear regression was used to test each null hypothesis. Bivariate linear regression requires that the assumptions of independence of observations, no significant bivariate outliers, linearity, and bivariate normal distribution are met. To test these assumptions, the Durbin-Watson, Casewise diagnostics, P-Plot, and a scatterplot were created for each pair of variables. There was independence of residual, as assessed by three Durbin-Watson's with the statis-

tics of 1.959 for autonomy satisfaction, 1.961 for relatedness satisfaction, and 1.979 for competency satisfaction. Casewise diagnostics determined case number 179 was greater than ±3 standard deviations for autonomy and competency satisfaction. However, after examining the data points for case number 179, it was found that there were no data entry or measurement errors. Rather, they were genuinely unusual values. Additionally, the researcher removed case number 179 and re-ran the bivariate regressions to find the results were unchanged ("We Make Statistics Easy", 2018). Tables 2 and 3 provide the Casewise diagnostics for autonomy and competency satisfaction. It should be noted that residuals were normally distributed as assessed by visual inspection of a normal probability plot. Figures 1, Figure 2, and Figure 3 provide the P-Plots for the various scores. Finally, an examination of each scatterplot shows that the assumptions of linearity and no extreme bivariate outliers are tenable for all three null hypotheses. The assumption of bivariate normal distribution was also met for all null hypotheses, as illustrated in the cigar shape data points observed in the scatterplots. Figures 4, Figure 5, and Figure 6 provide the scatterplots for the various scores.

Table 2

Casewise Diagnostics[a] for Autonomy Satisfaction

Case Number	Std. Residual	Autonomy Satisfaction	Predicted Value	Residual
179	-3.256	1.25	3.4957	-2.24567

Note. a. Dependent Variable: Autonomy Satisfaction

Table 3

Casewise Diagnostics[a] for Competence Satisfaction

Case Number	Std. Residual	Competence Satisfaction	Predicted Value	Residual
179	-3.449	1.333	3.914	-2.581

Note. a. Dependent Variable: Competence Satisfaction

Figure 1

Normal P-Plot of Regression Standardized Residual for Autonomy Satisfaction

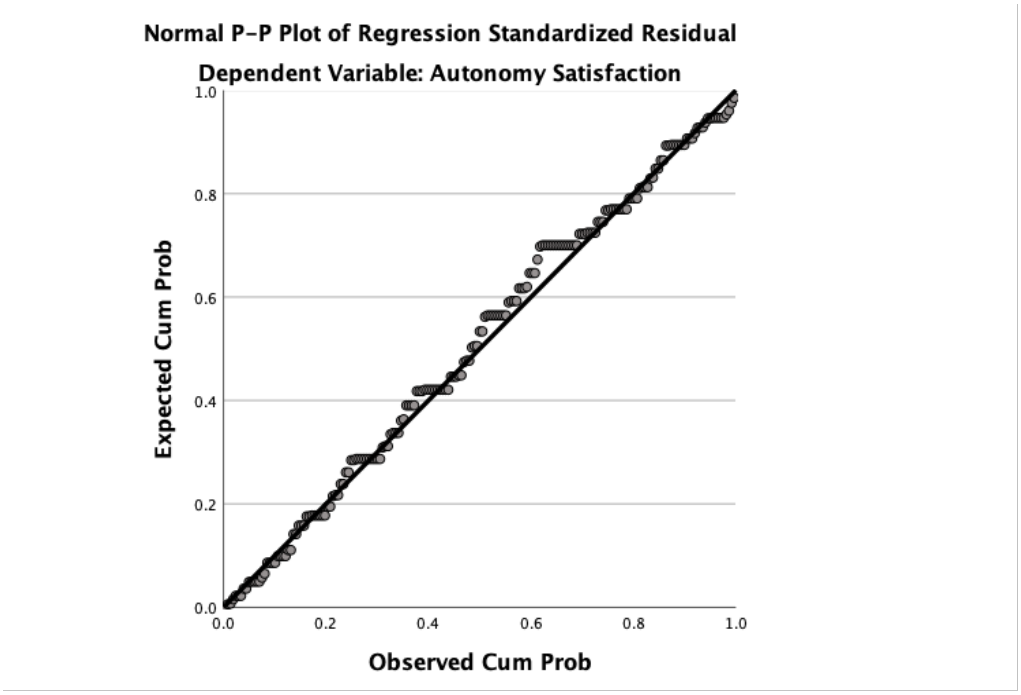


Figure 2

Normal P-Plot of Regression Standardized Residual for Relatedness Satisfaction

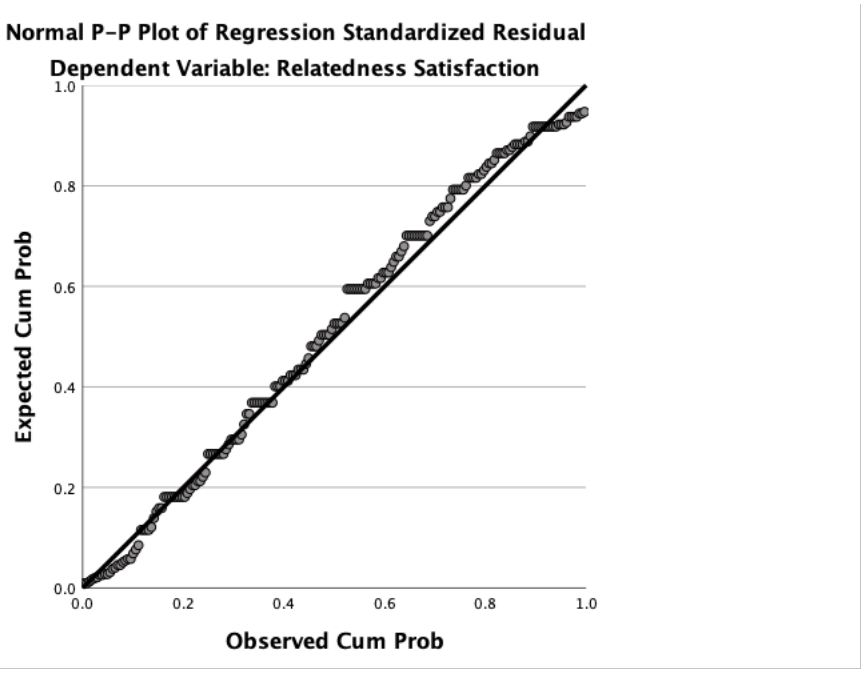


Figure 3

Normal P-Plot of Regression Standardized Residual for Competence Satisfaction

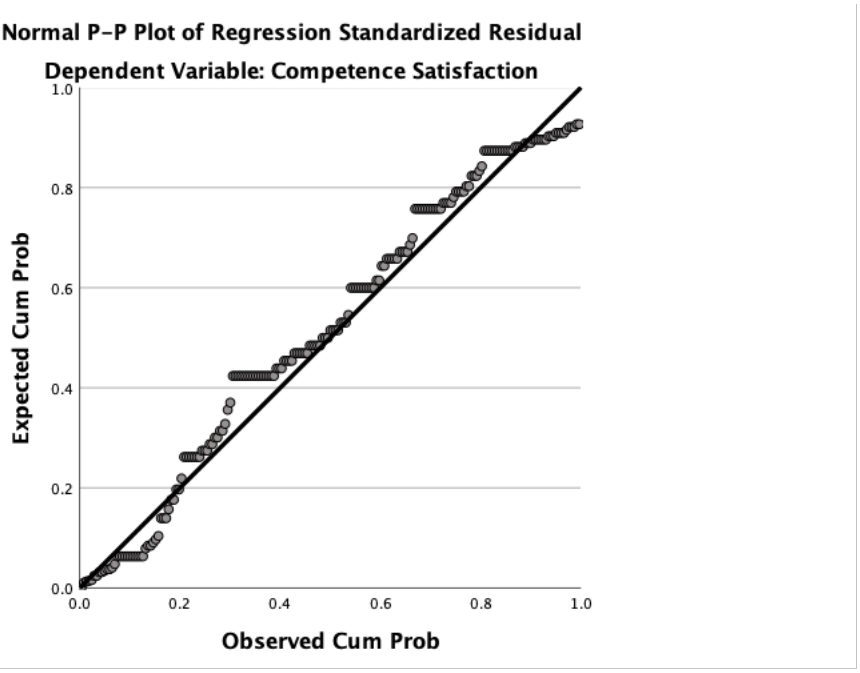


Figure 4

Scatterplot of Autonomy Satisfaction vs Food Insecurity Status

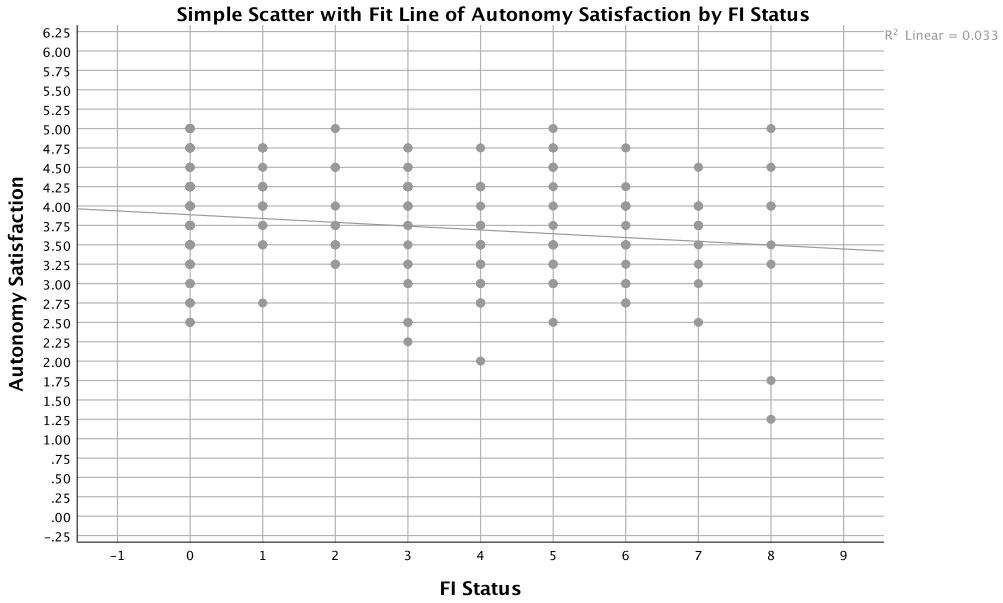


Figure 5

Scatterplot of Relatedness Satisfaction vs Food Insecurity Status

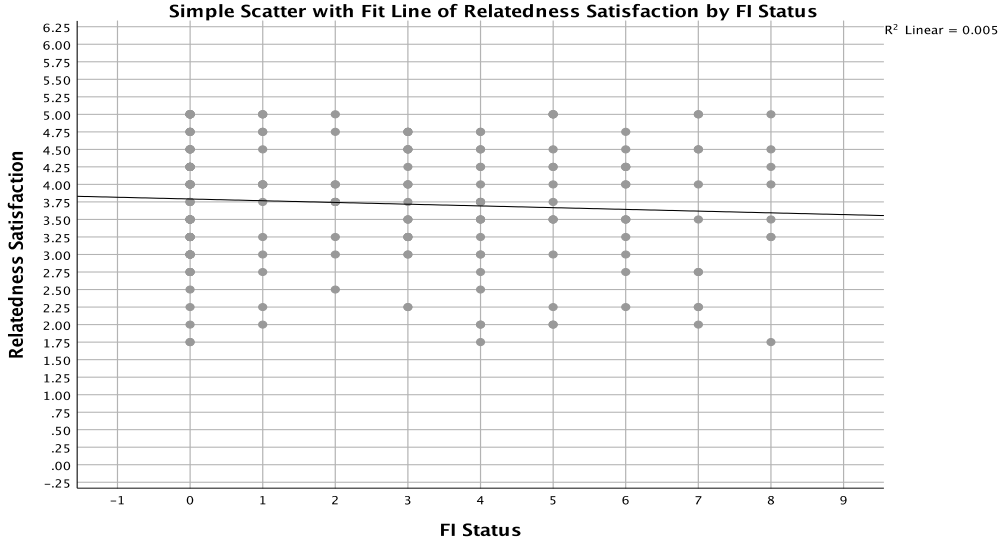
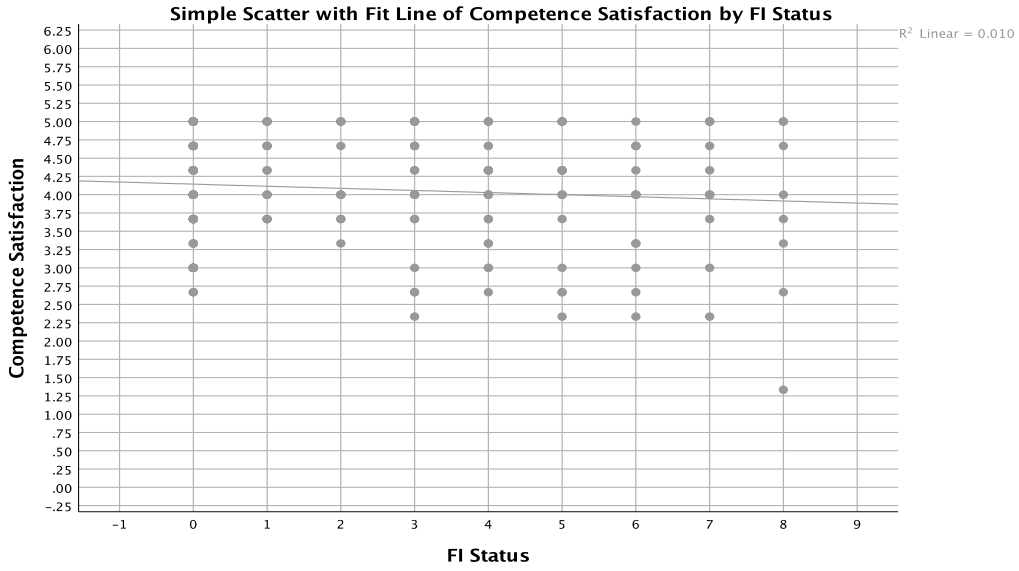


Figure 6

Scatterplot of Competence Satisfaction vs Food Insecurity Status



Null Hypothesis One

A bivariate linear regression was run to test null hypothesis one which states that *food-insecurity* cannot predict student *autonomy satisfaction* in post-secondary institutions. The regression equation for predicting autonomy satisfaction is, $Y = 3.98 - 0.049\ X_{\text{FI Status}}$. The 95% confidence interval of this slope was -.087 to -.011. Table 2 provides a summary of the regression analysis for the variable predicting autonomy satisfaction. Accuracy in predicting autonomy satisfaction, $R = -.18$, is low. A student's FI Status accounted for 3.3% of the explained variability in Autonomy Satisfaction.

Table 4

Coefficients

Model	*B*	*SE B*	*β*
1 (Constant)	3.89	.070	
(FI Status) Original Score	-.049	.019	-.18

Note. a. Dependent Variable: Autonomy Satisfaction R^2 =.033 (p=.012)

The results show significant evidence to reject null hypothesis one and conclude that a college student's FI status (M = 2.58, SD = 2.57) did significantly predict autonomy satisfaction scores (M = 3.76, SD = .87), $F(1, 193) = 6.501$, p = .012. Table 3 includes the results of the ANOVA analysis.

Table 5

ANOVA

Model	*SS*	*df*	*MS*	*f*	Sig.
Regression	3.093	1	3.093	6.501	.012
Residual	91.819	193	.476		
Total	94.912	194			

Note a. Dependent Variable: Autonomy Satisfaction, b. Predictor: (Constant), FI Status

Null Hypothesis Two

A bivariate linear regression was run to test null hypothesis two which states that *Food-insecurity* cannot predict student *relatedness satisfaction* in post-secondary institutions. The regression equation for predicting relatedness satisfaction is, $Y = 3.79 - .025X_{\text{Relatedness Satisfaction}}$. The 95% confidence interval of this slope was -0.073 to 0.023. Table 4 provides a summary of the

regression analysis for the variable predicting relatedness satisfaction. Accuracy in predicting relatedness satisfaction, R = -.073, is low. A college student's food insecurity status accounted for 0.5% of the variability in a college student's relatedness satisfaction.

Table 6

Coefficients

Model	*B*	*SE B*	*β*
1 (Constant)	3.792	0.088	
(FI Status)	-.025	0.024	-0.073
Original Score			

Note. a. Dependent Variable: Relatedness Satisfaction r^2 = 0.005 (p =.309)

The results in Table 5 failed to show significant evidence to reject the null hypothesis and the conclusion was that a college student's FI Status (M = 2.58, SD = 2.574) did not significantly predict their relatedness satisfaction (M = 3.7282, SD = .869), $F(1, 193) = 1.040$, p = .309.

Table 7

ANOVA

Model	*SS*	*df*	*MS*	*F*	Sig.
1 Regression	.786	1	.786	1.040	.309
Residual	145.809	193	.755		
Total	146.595	194			

Note. a. Dependent Variable: Relatedness Satisfaction, b. Predictor: (Constant), FI Status

Null Hypothesis Three

A bivariate linear regression was run to test null hypothesis three, which states that food insecurity cannot predict student *competency satisfaction* in post-secondary institutions. The regression equation for predicting competence satisfaction is $Y = 4.144 - .029X_{\text{competence satisfaction}}$. The 95% confidence interval of this slope was 0.28 to 0.37. Table 6 provides a summary of the regression analysis for the variable predicting competence satisfaction. Accuracy in predicting competency satisfaction, $R = -0.099$, is low. A college student's FI Status accounted for 1% of the explained variability in literary reading comprehension.

Table 8

Coefficients

Model	*B*	*SE B*	*β*
1 (Constant)	4.144	0.076	
(FI Status)	-0.029	0.021	-0.99
Original Score			

Note. a. Dependent Variable: Competence satisfaction $R^2 = 0.010$

The results failed to show significant evidence to reject the null hypothesis and conclude that a college student's FI Status ($M = 2.58$, $SD = 2.574$) did significantly predict competence satisfaction ($M = 4.07$, $SD = .75$), $F(1, 193) = 1.893$, $p = .170$. Table 7 provides the results of the ANOVA analysis.

Table 9

ANOVA

Model	*SS*	*df*	*MS*	*F*	*Sig.*
1 Regression	1.060	1	1.060	1.893	.170
Residual	108.093	193	.560		
Total	109.153	194			

a. Dependent Variable: Competence Satisfaction
b. Predictors (Constant), FI Status

CHAPTER FIVE: CONCLUSIONS

Overview

In this fifth and final chapter, there will be four sections. They are the following: (1) discussion, (2) implications, (3) limitations, and (4) recommendations for future research. The first section will review the findings of chapters two and four with the goal of comparing and contrasting previous literature and studies with the study that was completed in this document. This will be accomplished by restating each research question and examining them in detail. The second will take the information from the discussion portion of this chapter and find what it implies for the existing body of knowledge and how it will aid students, teachers, and administrators in the industry of education. The third will examine what limitations are present within the study that could threaten its internal and external validity. Finally, the recommendations for future research will be to encourage future analysts to: (1) examine FI and BPNs from a frustration standpoint along with satisfaction, (2) conduct a study within the traditional school year, (3) conduct a study in multiple states, (4) develop a study that utilizes mixed-methods, and (5) develop a study that explores whether there is value in addressing lower tier needs with the goal of helping higher tier in needs in Maslow's Hierarchy.

Discussion

This quantitative study assessed how a college student's food insecurity experience affects their BPN. This was accomplished by using the FIES and BPNFS to determine if there was a predictive relationship.

RQ1: Can food insecurity predict student autonomy satisfaction in post-secondary institutions?

The results of the study indicated that there was, in fact, a statistically significant predictive relationship between a college student's FI status and autonomy satisfaction (p = .012). However, the results show that R^2 is .033. Therefore, the results of this research question have a small effect size, showing there is little mean difference between FI college students' autonomy satisfaction and food secure college students' autonomy satisfaction. Furthermore, the correlation coefficient (R=-.18) indicated that accuracy in predicting autonomy satisfaction from a college student's FI is low. The r square (R^2 = .033) also reinforces this finding as it shows food insecurity only explained a 3.3% variance in a college student's autonomy satisfaction.

These findings indicate there is an insignificant difference between a FI college student's autonomy satisfaction and their food secure counterparts. When comparing the results with Maslow's hierarchy of needs, it is surprising to see that a college student's FI would not affect their desire to achieve self-actualization needs like autonomy satisfaction. FI is a "basic threat" to one's physiological needs. Maslow had posed that this would cause an individual to divert their drive to satisfy wants that may be higher up the hierarchy to address this threat (1943). Yet, that was not the case in this study, with FI accounting for an inconsequential change in the surveyed college students.

While the findings of the study did not show a significant statistical difference for RQ1, the literature explored in Chapter 2 still indicated FI does, in fact, hinder a college student's ability to act autonomously, and it may affect a student's autonomy satisfaction. For example, FI students aiming to succeed academically, no matter the circumstances, were not satisfied with their autonomy due to having to rely on others, work additional hours, prioritize where money was spent, and utilize food support programs or pantries (Daugherty et al., 2019; Miles et al., 2017). Furthermore, FI students reported experiencing hopelessness and anxiety due to a lack of the

means to act autonomously while trying to achieve academic success and meeting their need of hunger at the same time (Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Silva et al., 2015). Therefore, it is still vital for education administrators and practitioners to understand that a FI student's lack of personal autonomy and autonomy satisfaction may be lower than that of a non-FI student's (Daugherty et al., 2019; Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Miles et al., 2017; Silva et al., 2015). This is especially the case as programs are formulated, teaching strategies are developed, and counseling is provided (Shi & Lin, 2020).

RQ2: Can food insecurity predict student relatedness satisfaction in post-secondary institutions?

The conclusion of the study found there was no statistically significant predictive relationship between a college student's FI status and relatedness satisfaction ($p = .30$). The results also show that the R^2 is .0005, indicating the findings of this research question has a small effect size showing there is little mean difference between FI college students' relatedness satisfaction and food secure college students' relatedness satisfaction. Furthermore, the correlation coefficient (R=-.073) indicated that accuracy in predicting relatedness satisfaction from a college student's FI is low. The r square ($R^2 = .0005$) also reinforces this finding as it shows food insecurity only explained a .05% variance in a college student's relatedness satisfaction.

When considering Maslow's hierarchy of needs with these results, it is surprising that FI does not affect a college student's want to relate to their peers. As stated by Maslow, basic needs threats, like FI, can be a threat to higher-level wants and needs due to the nature of needing sustenance to survive. Yet, love and belonging needs are also an essential part of a human's psychological well-being (Maslow, 1943). With this thought taken into consideration, it could be

that FI is not devastating enough for college students to forgo meeting their need to relate with others around them.

When looking at the literature, the results of the study are not surprising since FI college students value their relationships. Zein et al. (2018) found that many of the students (62%) with FI in their survey valued their relationships and dignity over receiving sustenance from food pantries. Many claimed they were afraid of being shamed, ridiculed, and ultimately rejected from their peer groups (Zein et al., 2018). Furthermore, interviewed FI students in a qualitative study shared they were concerned about disappointing their families as they pursued their academics and struggled with hunger (Busch et al., 2014; Drotos & Cilesiz, 2014; Meza et al., 2019). Inversely, there were other studies that disagreed with the results of this research question as it was discovered FI students had also expressed they were unable to foster "meaningful social relationships" and were experiencing sadness, hopelessness, and frustration due to this deficiency in their lives (Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Silva et al., 2015).

RQ3: Can food insecurity predict student competency satisfaction in post-secondary institutions?

There was no statistically significant predictive relationship between a college student's FI status and competency satisfaction ($p = .170$). The results also show that the R^2 is .010, indicating the findings of this research question to have a small effect size, showing there is little mean difference between FI college students' competency satisfaction and food secure college students' competency satisfaction. Furthermore, the correlation coefficient (R=-.099) indicated that accuracy in predicting competency satisfaction from a college student's FI is low. The *r* square ($R^2 = .010$) also reinforces this finding as it shows food insecurity only explained a 1% variance in a college student's Competency satisfaction.

The results of the study display that FI college students' competence satisfaction surrounding their education cannot be predicted by their FI status; it differs from what is stated in Maslow's hierarchy of needs. Maslow believed an essential need, like having the need to address FI, would hinder an individual's higher needs, like self-actualization through satisfaction in competency, until it was addressed (1943). Yet, the results do not support this posited idea and seem to indicate that they are completely unrelated issues. Furthermore, the results of this study are contrary to the literature that was examined in Chapter 2. For example, a FI college student's collegiate measurable academic competency, GPA, was, in fact, affected by the circumstances and food secure state they were in (Camelo & Elliott, 2019; Hagedorn & Olfert, 2018; Raskind et al., 2019; Zein et al., 2019). Hagedorn and Olfert's study (2018) ($N = 692$) showed this as FI students' average GPA was 3.33 with one standard deviation of .03 grade points, while food secure students' average GPA was 3.51 with one standard deviation of .02 grade points ($p < 0.0001$). Furthermore, Zein et al. (2019) study with 1,331 students found that FI students had an odds ratio of 1.91 and a 95% CI of 1.19 – 3.07 of earning a GPA lower than 3.00 ($p = 0.001$). In addition to these findings, other researchers found that FI students would openly admit their current challenges would affect their mental well-being, physical health, focus in the classroom, academic performance, and ability to get a good night's sleep (Meza et al., 2019; Nagata et al., 2019a, 2019b, 2019c; & Silva et al., 2015).

Implications

At the conclusion of this study, the results were inconclusive for RQ1 due to the effect size being extremely low and having only 3.3% explained variance. RQ2 and RQ3 were insignificant, also indicating that FI and the three aspects of BPN do not have any predictive relationships worth mentioning. However, the literature examined in chapter 2 pertaining to FI and its

discovered effect on a college student's physical, mental, emotional, social, and academic well-being are a serious issue that should be addressed (Camelo & Elliott, 2019; Daugherty et al., 2019; Hagedorn & Olfert, 2018; Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Miles et al., 2017; Nagata et al., 2019a, 2019b, 2019c; Raskind et al., 2019; Silva et al., 2015; Zein et al., 2019). Therefore, FI amongst college students should be a concern amongst national policymakers, post-secondary administrators, university instructors, and activists who are working to improve student well-being. This is especially true since students who fail to achieve the top levels of Maslow's hierarchy may be unable to achieve their full potential as individuals and be future impact-makers in their communities (Hemelt & Marcotte, 2016; Maslow, 1943; Nikolaus et al., 2019b; Silva et al., 2015). Therefore, helping college students gain access to affordable and nutritious food should be a priority for stakeholders as it may be able to positively elevate the futures and capacity of FI College students.

Between 15% - 39% of college students, depending on the post-secondary institution and region they are residing in, are found to have measurable FI (Nikolaus et al., 2019a; Perez-Felkner et al., 2020). With numbers this large existing throughout the country, national and state legislators cannot ignore this particular population's need for sustenance and consistent access to food if college students are to be the future of the nation (Hemelt & Marcotte, 2016; Maslow, 1943; Nikolaus et al., 2019b; Silva et al., 2015). Therefore, national and state-level policies must be examined and adapted, and goals must be developed to change existing programs that may benefit FI college students. Most notably, national and state policymakers must address this gap by rewriting policies to ensure modern college students in need are not excluded from opportunities to receive essential sustenance. This is especially the case for the most affected subgroups

like first-generation attendees, females, and students of color (Camelo & Elliott, 2019; Laska et al., 2021; Miles et al., 2017).

University Administrators and instructors can also make a great impact on FI college students by taking this information and forming committees that examine the food security issues specific to their campuses and communities. Furthermore, the findings of these committees can be cross-referenced with experts and other institutions to determine the similarities and differences elsewhere, which will allow for greater informed decision-making. By doing so, programs can be uniquely tailored for each circumstance with solutions like on-campus food banks, meal assistance programs, a "pay it forward" initiative, a "donate my unused meals to someone in need" initiative, and subsidies for healthy food options for each specific need (J. A. Hale, 2020).

Finally, activists can strive to bring awareness to the needs FI college students face on their campuses, in their communities, and in their day-to-day decision-making. As more individuals on college campuses, in communities, and in positions of influence are made more aware and educated on the problems FI college students face, there will be greater empathy and initiatives developed towards meeting their needs. For example, fostering awareness on college campuses may help cultivate a stigma-free environment where students feel heard and are comfortable seeking help if they are struggling to meet their basic needs (Daugherty et al., 2019; Freudenberg et al., 2019). By making community members aware, business owners and other well-meaning members of society may take the initiative to help FI college students with meals, job opportunities, life-skills education, mentoring, and possibly a support system (Daugherty et al., 2019; Freudenberg et al., 2019; Hollifield-Hoyle & Hammons, 2015). Additionally, those in positions of power affected by advocates can make systemic changes in local, state, and national governments necessary for creating solutions for this in-need population. Furthermore, these individuals

may be able to muster unique teams that could help inform and equip future FI college students as they apply for university (Drotos & Cilesiz, 2014; Hollifield-Hoyle & Hammons, 2015; Silva et al., 2015).

Additionally, the results of not finding college students' FI status to be in a predictive relationship with autonomy, competency, and relatedness satisfaction is contrary to what was implied in the pre-existing literature. Rather, the results could signify there may be another factor affecting a FI college student's BPN. This additional factor may be the frustration aspect of BPN. Vansteenkiste and Ryan (2013) wrote in a literature review that "need frustration evokes ill-being and increased vulnerabilities for defensiveness and psychopathology." (Vansteenkiste & Ryan, 2013, p. 2). These all fall in line with literature pertaining to food insecurity and struggles college students are going through as researchers found FI college students were more likely to resort to substance abuse, were more susceptible to trading sex for money, experienced more health issues, and would forgo receiving help to maintain their social image with peers and friends (Homans, 1958; Lam et al., 2007; Meda et al., 2017; Nagata et al., 2019a, 2019b, 2019c, 2021; Raskind et al., 2019). Furthermore, recent research conducted by BPNs experts with higher education students (n = 226) concluded that individuals experiencing "BPNs frustration, emotional dysregulation, and emotional suppression" were "related to higher levels of borderline personality features" which include identity problems (Van der Kaap-Deeder et al., 2021). By placing the findings of the study, the collective information gleaned from the literature, and the findings revealed by BPN experts together, it would seem that FI college students who are experiencing frustration with their BPN may report a "false positive" of being satisfied with their autonomy, competency, and relatedness. This may be due to the case of individuals in this popula-

tion disassociating their true challenges and BPN frustration from their day-to-day life as a coping mechanism to go through the day. Therefore, further research on this topic must continue to determine if this additional factor, BPNs frustration in autonomy, competency, and relatedness, does affect a FI college student's responses to BPNs satisfaction in autonomy, competency, and relatedness. Doing so would allow future researchers to better understand the BPNs satisfaction and frustration state within FI college students as well as determine if BPNs frustration would affect the predictive relationship between a college student's level of FI and BPN satisfaction as a confounding variable.

Conversely, if the results of the study are not influenced by confounding variables and truly contradict what was implied in the related literature, this should not allow for the dismissal of FI in college students. Rather, it allows researchers to explore other areas where FI seriously impacts college students as well as how certain preceding issues cultivate FI in a college student. The literature has indicated that college students experiencing FI are usually affected in the areas of physical and mental well-being, academic achievement, social settings, familial and community relations, and financial wellness. Yet, they have not been exhaustively explored and require further examination in congruence with FI (Camelo & Elliott, 2019; Daugherty et al., 2019; Hagedorn & Olfert, 2018; Hollifield-Hoyle & Hammons, 2015; Meza et al., 2019; Miles et al., 2017; Nagata et al., 2019a, 2019b, 2019c; Raskind et al., 2019; Silva et al., 2015; Zein et al., 2019). Additionally, unknown and unexplored issues arise in college students' lives when they experience FI. Therefore, it will be prudent to interview FI college students to glean this knowledge and grow the body of literature pertaining to this issue.

Limitations

While there were participants from community colleges, public universities, and private colleges, all individuals were from the state of Florida. By collecting data from Floridian students exclusively, the results of this study only carry merit within state lines and would not be readily usable in other parts of the country. Furthermore, this study was conducted during the summer. With this in mind, students taking summer academic courses may have a different mindset pertaining to education and have a different set of circumstances in comparison to students who attend exclusively during the fall and spring semesters. Therefore, the results of the study could have been vastly different if it had been done during the traditional school year or spread out throughout an entire year with participating students from fall, spring, and summer.

From an internal standpoint, there were three limitations that need to be considered when examining this study. First, the author had mistakenly posed three questions instead of four on the questionnaire to participants concerning their perception with competency satisfaction. While the psychometric artifact, BPNSFs, only requires three questions per subscale to maintain validity, the author chose to have four questions for each subscale (Chen et al., 2014). With this mismatch, there may be a minuscule difference in statistical results. Secondly, the study was exclusively quantitative in nature. While this is beneficial for gleaning data for statistical analysis, the results of this study did not help the researcher read "between the lines" to understand participant motives and thought processes. Therefore, it would have been beneficial for the study to have been a mixed-method process where students were interviewed with additional questions pertaining to their food insecurity and Basic Psychological Needs. Finally, the utilization of a correlational design and convenience sampling method in the study comes with limitations. The correlational design is only able to provide the researcher with the information necessary to determine if

there is a relationship between FI status and BPNs autonomy, competency, and relatedness. It does not allow for the researcher to determine if a college student's FI status causes their BPNs to change. Furthermore, the usage of the convenience sampling method may allow for sampling bias, lack of variety, and unknown errors to occur, which may result in the study's sample being skewed and not representative of the overall population from the research sights.

Recommendations for Future Research

The results of this study have brought to light several new directions to explore. First, the study exclusively examined if FI status in college students could predict their BPNs satisfaction. While the results showed a negative predictive relationship with autonomy satisfaction, the others had no correlation. This result was surprising as the literature did not seem to indicate students would be satisfied with their relatedness and competency (Homans, 1958; Lam et al., 2007; Meda et al., 2017; Nagata et al., 2019c, 2021; Raskind et al., 2019). Therefore, a future researcher should consider a holistic examination of BPNs, which would include both the satisfaction and frustration aspects of autonomy, relatedness, and competency (Vansteenkiste & Ryan, 2013). To do so, the researcher would be able to see how they interact with one another as well as how they interact with a college student's level of FI, all of which would provide some clarity concerning the surprising results of this study.

Secondly, while the goal of the researcher was to collect data from college students in the traditional school year for this study, it did not happen due to the time needed to collect permissions from institutions. Rather, the summer semester was in session when data collection occurred. This period of the academic year is shorter, has more condensed courses, and may have a significantly different student population (Walsh et al., 2019). Therefore, it would be prudent for future studies pertaining to this topic to be done during the traditional fall and spring semesters.

Thirdly, the researcher collected data exclusively from the state of Florida. While it was beneficial for understanding the student population of the state, it does not carry enough diversification to provide a good representation of the "general FI college student" in the United States. Consequently, it would be extremely beneficial for future researchers to develop a national study with a greater sample size to better understand if there is a predictive relationship between the BPNs status of college students and their FI.

At the conclusion of this study, the results were different than what was anticipated after examining pertinent literature. Nonetheless, the results added to the body of knowledge. Yet, the statistically insignificant results from this study also raised more questions and brought about more hypotheses. Therefore, the researcher would recommend a mixed methods study that would still have a quantitative aspect to it while also implementing an interview process with college students who are FI to better understand their perceived BPNs status and the thought process behind it. In addition to conducting a mixed methods study on FI and BPNs, it would also be beneficial to conduct interviews that do not focus on BPNs and would simply explore how FI impacts a college student. By doing so, it may allow for the researcher to determine if there are unseen challenges or needs for this population that have not been determined before, as well as reinforcing what has already been found in education literature pertaining to FI.

Finally, a college student's FI status had a predictive relationship with autonomy satisfaction with an extremely small effect size and an explained variance of 3.3%, indicating the results were insignificant. This finding opens the door to further questions pertaining to the body of knowledge surrounding Maslow's model. A. J. Hale et al. (2019) expressed that research pertaining to addressing needs on the hierarchy was highly important, especially when it came to deter-

mining whether addressing lower-level needs or higher-level needs were more effective in helping professionals succeed (A. J. Hale et al., 2019). The result of this hypothesis reveals that FI (a part of the physiological needs tier) may not predict autonomy satisfaction (a part of the esteem and self-actualization needs tiers) in college students. Consequently, it would be wise for future researchers to conduct studies that have FI participants who provide their BPNs satisfaction and frustration status repeatedly over a set period while providing them with the means to elevate them out of FI. Doing so, would be the second step in determining if meeting a lower-tier need on Maslow's Hierarchy may or may not positively help individuals achieve and meet higher-tiered needs.

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APPENDICES

Appendix A

Basic Psychological Need Satisfaction and Frustration Scale (BPNSNF)

1	2	3	4	5
Not true at all				Completely True

1. I feel a sense of choice and freedom in the things I undertake.	1	2	3	4	5
2. Most of the things I do feel like “I have to”.	1	2	3	4	5
3. I feel that the people I care about also care about me.	1	2	3	4	5
4. I feel excluded from the group I want to belong to.	1	2	3	4	5
5. I feel confident that I can do things well.	1	2	3	4	5
6. I have serious doubts about whether I can do things well.	1	2	3	4	5
7. I feel that my decisions reflect what I really want.	1	2	3	4	5
8. I feel forced to do many things I wouldn’t choose to do.	1	2	3	4	5
9. I feel connected with people who care for me, and for whom I care.	1	2	3	4	5
10. I feel that people who are important to me are cold and distant towards me.	1	2	3	4	5
11. I feel capable at what I do.	1	2	3	4	5
12. I feel disappointed with many of my performances.	1	2	3	4	5
13. I feel my choices express who I really am.	1	2	3	4	5
14. I feel pressured to do too many things.	1	2	3	4	5
15. I feel close and connected with other people who are important to me.	1	2	3	4	5
16. I have the impression that people I spend time with dislike me.	1	2	3	4	5
17. I feel competent to achieve my goals.	1	2	3	4	5

18. I feel insecure about my abilities.	1	2	3	4	5
19. I feel I have been doing what really interests me.	1	2	3	4	5
20. My daily activities feel like a chain of obligations.	1	2	3	4	5
21. I experience a warm feeling with the people I spend time with.	1	2	3	4	5
22. I feel the relationships I have are just superficial.	1	2	3	4	5
23. I feel I can successfully complete difficult tasks.	1	2	3	4	5
24. I feel like a failure because of the mistakes I make.	1	2	3	4	5

Scoring information:

Autonomy satisfaction: items 1, 7, 13, 19

Autonomy frustration: items 2, 8, 14, 20

Relatedness satisfaction: items 3, 9, 15, 21

Relatedness frustration: items 4, 10, 16, 22

Competence satisfaction: items 5, 11, 17, 23

Competence frustration: items 6, 12, 18, 24

Appendix B

Food Insecurity Experience Scale (FIES)

During the last 12 months, was there a time when, because of lack of money or other resources:

1. You were worried you would not have enough food to eat?
2. You were unable to eat healthy and nutritious food?
3. You ate only a few kinds of foods?
4. You had to skip a meal?
5. You ate less than you thought you should?
6. Your household ran out of food?

7 You were hungry but did not eat?

8. You went without eating for a whole day?

Appendix C

Recruitment Email to College Students

Dear Student:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to understand how food insecurity affects a college student's feelings of competency, autonomy, and relatedness in the college classroom and on campus, and I am writing to invite eligible participants to join my study.

Participants must be 18 years of age or older, and they must be attending and studying in a college or university. Participants, if willing, will be asked to take a survey on Survey Monkey and answer questions pertaining their food intake, frequency of meals, personal perception, and personal wellbeing. It should take approximately 6 minutes to complete the procedure listed. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please click here [redacted]

A consent document is provided at the first page of the survey. The consent document contains additional information about my research. After you have read the consent form, please click the yes button to proceed to the survey. Doing so will indicate that you have read the consent information and would like to take part in the survey.

Participants, if desired, may be placed in a raffle for visa gift cards that have varying amounts. These amounts are 1 for $50, 1 for $25, 2 for $10, and 1 for $5.

Sincerely,

Andrew Tlucek
PhD candidate
[redacted]

Appendix D

Consent Form

Title of the Project: The Predictive Relationship Between Student Food-Insecurity and Basic Psychological Needs Within College Students
Principal Investigator: [redacted], Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be 18 years of age or older, and a college student who is currently enrolled in courses on a college campus. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to understand how food insecurity affects one's internal mental state concerning their autonomy and competency in the classroom and how they feel they relate with others on a college campus.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. Complete an online survey. It should take roughly 8 minutes to complete.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study.

However, benefits to society include giving colleges, administrators, and instructors a better understanding as to how food insecurity may affect college students. This way they will have the baseline information available to determine ways to help food insecure college students with their food, personal, and academic needs.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be anonymous.
- Data collected from you may be used in future research studies and shared with other researchers. If data collected from you is reused or shared, any information that could identify you, if applicable, will be removed beforehand.
- Data will be stored[on a password-locked computer and an encrypted folder. After five years, all electronic records will be deleted.

How will you be compensated for being part of the study?

Participants will not be compensated for participating in this study. However, at the conclusion of the survey, participants will be placed in a raffle where they will receive a chance to be drawn for 5 different visa gift cards. They will be as follows: 1 $50 card, 1 $25 card, 2 $10 cards, and 1 $5 card. At the end of the survey an option will be provided where your student ID can be typed in. By doing so, you will have placed yourself in the raffle for the visa gift cards. After the random drawing the gift cards will be given to your institution and handed to the individuals bearing the student ID numbers drawn.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researchers conducting this study is [redacted] and [redacted]. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at [redacted] or [redacted]. You may also contact the researcher's faculty sponsor, [redacted], at [redacted].

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, [redacted], and our email address is [redacted].

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

Before agreeing to be part of the research, please be sure that you understand what the study is about. You can print a copy of the document for your records. If you have any questions about the study later, you can contact the researcher using the information provided above.

Appendix E

IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

March 27, 2023

[redacted]

Re: IRB Exemption - IRB-FY22-23-1109 THE PREDICTIVE RELATIONSHIP BETWEEN STUDENT FOOD-INSECURITY AND BASIC PSYCHOLOGICAL NEEDS WITHIN COLLEGE STUDENTS

Dear [redacted],

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at [redacted].

Sincerely,

[redacted]

Administrative Chair of Institutional Research

Research Ethics Office