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Exploring the Roles of Food Parenting Practices, Dietary Self-Efficacy, and Food Insecurity on Fruit and Vegetable Consumption Among College Students

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Abstract

The current study explores the links between food parenting practices during childhood, specifically restriction and pressure to eat, and fruit and vegetable consumption among college students. It further investigates whether dietary self-efficacy mediates this relationship and how food insecurity moderates the mediated pathway. Drawing upon Bronfenbrenner's ecological systems theory and Bandura's social cognitive theory, the study hypothesizes that dietary self-efficacy acts as a mediator in the relationship between childhood food parenting practices and current fruit and vegetable consumption among college students. Additionally, it examines the moderating role of food insecurity on this mediated pathway.

Participants were recruited through Cornell's SONA system and the Prolific online platform to complete a survey assessing their childhood food parenting experiences, current dietary self-efficacy, fruit and vegetable consumption, and food insecurity status. A total of 278 actively enrolled college students between the ages of 18-29 completed the anonymous online survey. The data were analyzed using bivariate Pearson correlations, ordinary least squares regression analyses, and moderated mediation analyses.

The findings reveal that dietary self-efficacy significantly mediates the relationship between food parenting practices, particularly parental restriction, and fruit and vegetable consumption among college students. Contrary to initial hypotheses, pressure to eat did not significantly predict fruit or vegetable consumption nor was it associated with dietary self-efficacy. Also contrary to initial hypotheses, food insecurity was not found to moderate the pathways between dietary self-efficacy and fruit consumption, nor vegetable consumption.

This study contributes to the understanding of how early-life food parenting practices influence dietary behaviors among college students, highlighting the importance of dietary self-efficacy.

The findings suggest that enhancing dietary self-efficacy could be a key strategy in promoting healthier eating behaviors among college students. However, additional research is needed to explore the complexity of food insecurity among college students and its potential impact on eating behaviors.

Keywords: food parenting practices, dietary self-efficacy, fruit and vegetable consumption, food insecurity, college students

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Table of Contents

List of Tables

List of Figures

CHAPTER 1: INTRODUCTION

Childhood experiences play a pivotal role in shaping individual eating behaviors, especially during the critical phase of emerging adulthood. Parents influence eating behaviors developed in childhood, which are often maintained into and throughout adulthood (Birch & Fisher, 1998; Branen & Fletcher, 1999; Kelder et al., 1994), though additional research into how the interactions between parents and children regarding food can impact the development of eating habits is still needed (Galloway et al., 2010). As they navigate through a transitional phase, many individuals tend to carry forward behaviors they adopted during childhood into young adulthood as they seek balance and comfort (Harakeh et al., 2004). Emerging adulthood, typically spanning from the late adolescence into the mid-twenties, is a distinctive period characterized by significant transitions, identity exploration, and often risky health behaviors (Arnett, 2000; Grace, 1997; Lloyd-Richardson et al., 2009; Wood et al., 2018). This period is marked by a shift from dependence on parents to increased autonomy in decision-making, often resulting in increased unhealthy eating behaviors (LaCaille et al., 2011; Marquis, 2005; Rappoport, 2003; Stok et al., 2018), Therefore, it is essential to examine the enduring impact of early parental influence on individuals in emerging adulthood.

The current study is grounded in ecological systems theory and social cognitive theory, which together provide a comprehensive framework for understanding how parental influence, self-efficacy, and environmental factors shape dietary choices during emerging adulthood. Bronfenbrenner's ecological systems theory posits that human development is shaped by a series of nested environmental systems, ranging from the immediate microsystem to the overarching macrosystem (Bronfenbrenner, 1979). The interplay between an individual's unique characteristics and these environmental layers influences health behaviors (Bronfenbrenner,

1999; Sallis et al., 2008). The application of ecological models to the study of dietary behaviors has been supported by researchers, suggesting that these frameworks can provide valuable insights into consumption patterns (Hemar-Nicolas et al., 2013; Wrobleski et al., 2018).

The current study explores the multifaceted dimensions of parental influence on eating behaviors and their enduring impact on emerging adulthood, in a sample of college students. Parents, as primary influences, profoundly shape the earliest and most common food context for their children. Their influence extends prominently through communication and feeding practices (Clark et al., 2007; Puhl et al., 2022; Wardle et al., 2005), referred to as food parenting practices. Food parenting practices is a term coined by Vaughn and colleagues (2016) to highlight the specific controlling practices that represent the practices related to the three underlying higher order constructs “coercive control, structure, and autonomy support” (Vaughn et al., 2016, pg. 1) of food parenting, distinct from parenting style and feeding strategies. Research consistently underscores the significance of understanding parental influence, given its profound impact on cognitive, physical, emotional, and social development throughout an individual's life (Gittleman et al., 1998; Mahmood et al., 2021; Shrewsbury et al., 2010).

Coercive control is one of the higher-order constructs of food parenting practices, which encompasses strategies such as restriction and pressure to eat (Orlowski et al., 2022; Vaughn et al., 2016). Controlling food parenting practices, particularly restriction and pressure to eat, have been shown to be directly connected to dietary patterns related to eating pathology and nutritional intake in childhood (Clark et al., 2007; Gregory et al., 2010) and later in life (Galloway et al., 2010). Restriction refers to the practice of limiting children's access to certain foods, while pressure to eat involves encouraging or pressuring children to consume specific foods. These two distinct food parenting practices, restriction and pressure to eat, are combined

in the current study to represent the overall concept of coercive control within the broader domain of food parenting practices (Orlowski et al., 2022; Vaughn et al., 2016). The term ‘controlling food parenting practices’ refers to the construct of general controlling food parenting practices which will be included in this study as the combined subscore of restriction and pressure to eat. Persistent control over children’s eating behaviors has been shown to lead to overindulgence in restricted foods and avoidance of pressured foods when no longer under that control (Galloway et al., 2010). These patterns may be explained by a reliance on external, rather than internal, food cues of satiety and hunger and an aversion to foods associated with unpleasant feeding practices. Parental food communication is also linked to eating behaviors and attitude (Baiocchi-Wagner & Talley, 2013; Kaplan et al., 2006). Parents often demonstrate an understanding of fundamental nutritional principles and report an interest in promoting healthy eating habits in their children, though they frequently lack concrete methods to implement this goal (Hart et al., 2015). The majority of parents also seem to have limited knowledge about the formation of their child's body image (Hart et al., 2015), typically lacking awareness of the positive connection between body contentment and the adoption of healthy eating behaviors.

An abundance of literature has explored the effects of these controlling food parenting practices on dietary patterns during childhood. Findings from these studies demonstrate that lower fruit and vegetable consumption is associated with parental pressure to eat (Fisher et al,. 2008) while parental restriction of palatable foods has been linked to increased preference for those restricted foods (Fisher & Birch, 1999). Research has consistently shown that self-efficacy plays a significant role in mediating the associations between perceived parental behavior and adolescent dietary behaviors (Ma & Hample, 2018). However, additional research is still needed

to explore the mechanisms underlying this link over time, as these studies were cross-sectional and did not examine the longitudinal effects.

A few studies have explored the longitudinal effects of controlling food parenting practices in childhood, finding that they predict disinhibited eating behaviors in adult populations. High levels of controlling food parenting practices, particularly restriction and pressure to eat, can create a negative social and emotional experience, potentially affecting children's dietary patterns long-term (Mahmood et al., 2021). Conversely, parental encouragement and moderate restriction have been shown to positively influence children's dietary habits, suggesting a nuanced approach to parental influence (Mahmood et al., 2021). Existing literature has found controlling food parenting practices are associated with lower satiety responsiveness - eating in the absence of hunger and not eating when hungry (Van Diest & Tylka, 2010) and disordered eating behaviors among adolescents (Loth et al., 2014). However, a gap in the literature still exists, and additional research examining how these controlling food parenting practices predict fruit and vegetable consumption longitudinally is needed, as well as literature examining a composite variable of controlling food parenting practices, as most current literature examine either restriction and pressure to eat separately or overall feeding style. However, a specific consideration of overall coercive practices would be beneficial to better understanding the influence of these practices.

A systematic review of interventions aimed at promoting healthy eating among college-aged adults revealed that the majority of these interventions were based on social cognitive theory (Kelly et al., 2013). According to social cognitive theory, self-efficacy is a key construct in the development of behavioral patterns, which occurs as reciprocal dynamic interactions take place between an individual and their environment (Bandura, 1977; 1998). Self-efficacy is the

belief an individual has in their capacity to effectively perform tasks and meet given expectations and has been long established as a significant predictor of health behaviors (Bandura, 1997; Sallis & Owen, 1999; Zhang et al., 2019), specifically dietary behaviors (e.g., Anderson et al., 2000, 2007; Brug & de Vries, 1995). Self-efficacy is widely established as a correlate and predictor of dietary intake across the lifespan, including both childhood (e.g., Elmore & Sharma, 2014) and emerging adulthood (e.g., Nastaskin, & Fiocco, 2015).

As indicated in social cognitive theory and the ecological systems theory, parental influences affect individual development and growth. As posited by social cognitive theory, health behavior change occurs in the context of reciprocal dynamic interplay between individual and environmental determinants (Bandura, 1998). Bandura has emphasized the importance of considering domain specific self-efficacy (2006). Dietary self-efficacy refers to a person's confidence in their ability to select nutritious foods despite challenges that may arise (Lubans et al., 2012). Dietary self-efficacy is highly linked to eating behaviors in college, including higher rates of fruit and vegetable consumption (Fernández, et al., 2015). In the current study, I will examine dietary self-efficacy as a mediator between controlling food parenting practices in childhood and rates of fruit and vegetable consumption among college students.

Beyond the family context, societal and structural issues must be considered as well as these effects often vary based on context, specifically the food environment which encompasses both food insecurity and access. Food insecurity occurs when “access to adequate food is limited by a lack of money and other resources” (Coleman-Jensen et al., 2018, pg. 7). Approximately one-third of college students in the U.S. report experiencing some level of food insecurity, with prevalence rates ranging from 35-42% (Bruening et al., 2017), further exacerbated by the challenges brought about by the COVID-19 pandemic (McCoy et al, 2022; Owens et al., 2020).

Young adults facing food insecurity are less likely to consume fruits and vegetables (Thompson et al., 2018), more likely to report their health as fair or poor (Reeder et al., 2020), and are at increased risk for chronic disease (Nagata et al., 2019). Furthermore, food insecurity can lead to adverse academic outcomes and reduced work productivity (Ahmad et al., 2021; Hege et al., 2021; Wolfson et al., 2021).

In the current study, it is posited that food insecurity may significantly influence the link between an individual's confidence in their ability to make healthy dietary choices and their actual consumption practices. Considering the principles of ecological systems theory, it is important to examine how context, such as the limited availability of nutritious food options, may alter how effectively a person's self-efficacy translates into healthy eating behaviors. Constraints imposed by the experience of food insecurity in one's immediate food environment, such as limited resources, might override self-efficacy and parental influence, thus acting as a moderating factor. Consequently, the expected link between dietary self-efficacy and fruit and vegetable intake may be weakened or insignificant if an individual is experiencing food insecurity. The research implies that when individuals encounter food scarcity, their practical ability to follow certain dietary practices is hampered by external factors, potentially diminishing the role of self-efficacy and parental influence in such contexts. Therefore, the current study seeks to elucidate how food insecurity modifies the relationship between dietary self-efficacy, and eating behaviors, with an emphasis on understanding these dynamics to inform interventions that can effectively address the nutritional needs of emerging adults in various food security contexts.

Data for the current study was collected as part of a larger study, through a Qualtrics survey available to individuals over the age of 18 years old who were actively enrolled in

college. Recruitment was conducted through Cornell University's SONA system and Prolific, a global data collection and analyses company. Eligible respondents completed an online survey in which they reported sociodemographic information and their average daily fruit and vegetable intake. Additionally, respondents completed several rating scales in which they reported their recollections of parental restriction and pressure to eat in childhood through middle school (i.e., middle childhood), as well as current feelings of dietary self-efficacy and experiences with food insecurity. In order to test the mediator and moderator functioning together in the same model, a moderated mediation analysis was tested using the SPSS PROCESS macro, model 14 (Hayes, 2022). In this model, I am examining the effects of controlling food parenting practices in childhood on fruit and vegetable consumption among college students, whether this association is mediated by dietary self-efficacy, and whether food insecurity influences the magnitude of the indirect effect of dietary self-efficacy on fruit and vegetable consumption (see Figure 1).

This study contributes to existing knowledge by taking a unique approach to understanding the influence of controlling food parenting practices during childhood on dietary self-efficacy and eating behaviors among college students. Given that many parents grapple with the challenges of navigating a complicated food environment with mixed health messaging (Hart et al., 2015), this research aims to shed light on how these factors interact and affect eating habits later in life. This research will also examine when these associations may be impacted by food insecurity, which is critical to consider, as rates of food insecurity among college students are three to four times higher than of the general population in the United States (Bruening et al., 2017).

Statement of Purpose

The primary aim of this study is to elucidate the intricate associations between controlling food parenting practices in childhood and their long-term effects on fruit and vegetable consumption among college students. By integrating the frameworks of ecological systems theory and social cognitive theory this research seeks to explore not only the direct impact of early food-related experiences but also how these experiences interact with individual factors such as dietary self-efficacy and broader contextual factors like food insecurity. This comprehensive approach allows for a deeper understanding of the multifaceted influences on eating behaviors, highlighting the role of both environmental contexts and personal beliefs in shaping dietary habits. Through this investigation, the study aims to contribute valuable insights into the mechanisms through which early life experiences and current environmental conditions interact to influence dietary choices, with a particular focus on the consumption of fruits and vegetables among college students.

Furthermore, this research endeavors to provide a foundation for the development of targeted interventions that empower parents to support their children in cultivating lasting healthy eating behaviors. By identifying the key factors that influence dietary self-efficacy and understanding how food insecurity may moderate these relationships, the study has the potential to inform strategies for universities and other institutions to more effectively address the challenges associated with promoting healthy eating among students. Ultimately, the findings from this study are expected to offer actionable insights for both families and educational institutions, enabling them to create environments that foster healthier dietary choices and contribute to the overall well-being of young adults.

Research Questions and Hypotheses

Drawing upon the principles of ecological systems theory and social cognitive theory, the following research questions and associated hypotheses were developed for the current study:

Research Question 1: Are controlling food parenting practices (restriction and pressure to eat) during childhood associated with fruit and vegetable consumption among college students?

Hypothesis 1a: Controlling food parenting practices (parental restriction and pressure to eat) in childhood will be negatively associated with higher fruit consumption among college students.

Hypothesis 1b: Controlling food parenting practices (parental restriction and pressure to eat) in childhood will be negatively associated with vegetable consumption among college students.

Hypothesis 1c: Parental restriction in childhood will be negatively associated with higher fruit consumption among college students.

Hypothesis 1d: Parental restriction in childhood will be negatively associated with higher vegetable consumption among college students.

Hypothesis 1e: Parental pressure to eat in childhood will be negatively associated with higher fruit consumption among college students.

Hypothesis 1f: Parental pressure to eat in childhood will be negatively associated with higher vegetable consumption among college students.

Research Question 2: Does dietary self-efficacy mediate the association between controlling food parenting practices and fruit and vegetable consumption among college students?

Hypothesis 2a: Dietary self-efficacy will mediate the association between controlling food parenting practices in childhood and fruit consumption among college students. It is expected that controlling food parenting practices will be negatively associated with dietary self-efficacy, which will be positively associated with fruit consumption.

Hypothesis 2b: Dietary self-efficacy will mediate the association between food parenting practices in childhood and vegetable consumption among college students. It is expected that controlling food parenting practices will be negatively associated with dietary self-efficacy, which will be positively associated with vegetable consumption.

Hypothesis 2c: Dietary self-efficacy will mediate the association between restriction in childhood and fruit consumption among college students, It is expected that restriction will be negatively associated with dietary self-efficacy, which will be positively associated with fruit consumption.

Hypothesis 2d: Dietary self-efficacy mediates the association between restriction in childhood and vegetable consumption among college students. It is expected that restriction will be negatively associated with dietary self-efficacy, which will be positively associated with vegetable consumption.

Hypothesis 2e: Dietary self-efficacy mediates the association between pressure to eat in childhood and fruit consumption among college students. It is expected that pressure to eat will be negatively associated with dietary self-efficacy, which will be positively associated with fruit consumption.

Hypothesis 2f: Dietary self-efficacy mediates the association between pressure to eat in childhood and vegetable consumption among college students, It is expected that pressure to eat will be negatively associated with dietary self-efficacy, which will be positively associated with vegetable consumption.

Research Question 3: How does food insecurity moderate the indirect effect of dietary self-efficacy on fruit and vegetable consumption among college students?

Hypothesis 3a: In a model examining food parenting practices and fruit consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on fruit consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

Hypothesis 3b: In a model examining food parenting practices and vegetable consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

Hypothesis 3c: In a model examining restriction and fruit consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on fruit consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

Hypothesis 3d: In a model examining restriction and vegetable consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

Hypothesis 3e: In a model examining pressure to eat and fruit consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on fruit consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

Hypothesis 3f: In a model examining pressure to eat and vegetable consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

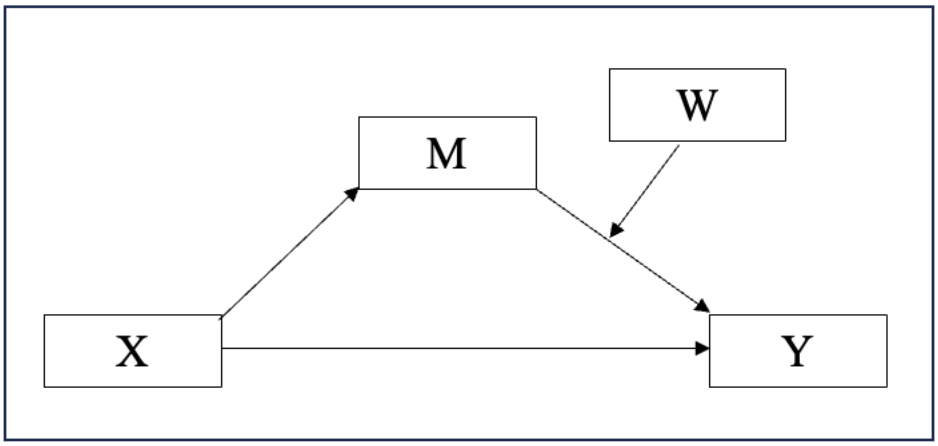

Figure 1: X – Independent Variable [(1) Food Parenting Practices, (2) Restriction, (3) Pressure to Eat]; Y – Dependent Variable [(1) Fruit Consumption, (2) Vegetable Consumption]; M – Mediator [Dietary Self-Efficacy]; W – Moderator [Food Insecurity]

CHAPTER 2: LITERATURE REVIEW

Emerging adulthood, spanning from ages 18 to 25, often considered a phase of optimal health, is paradoxically marked by the establishment of unhealthy lifestyles (Dinger, 1999; Scott, 2007; Stok et al., 2018; Zaborowicz et al., 2016; Zick et al., 2007). This transitional phase is aptly labeled "emerging adulthood," a period distinct from both adolescence and young adulthood in which individuals face a distinctive set of challenges. They navigate a delicate balance between growing independence and autonomy while still grappling with varying degrees of financial dependence. Many also experience the shift from living with their families to independent or co-living with peers for the first time, particularly for college age students. Research suggests that dietary habits during this period become more difficult to maintain, primarily driven by newfound autonomy, an abundance of choices, evolving schedules, and a lack of prior experience in making dietary decisions without parental guidance (Freedman & Connors, 2010; Lloyd-Richardson et al., 2009; Sengör & Gezer, 2019). Research has pinpointed the transition to adulthood as a critical period for establishing independent behaviors, including those related to health and nutrition, as this is the time when many lifelong habits are formed and that the dietary practices of college students are marked by a lack of variety and by nutritional deficiencies which have long-term implications for their health and future well-being (Nelson et al., 2008).

Moreover, access to food, particularly in the college environment, plays a substantial role in shaping dietary choices. The level of food access in an individual's life can either grant control over dietary decisions or render some aspects beyond their control, potentially amplifying or minimizing the effects of self-efficacy. Food insecurity, defined as the inability to acquire adequate food in a socially acceptable way, affects between one-quarter and one-third of U.S.

college students, with rates exacerbated by the COVID-19 pandemic (Glantsman et al., 2022; McCoy et al., 2022). Those experiencing food insecurity are more likely to have poor health outcomes, including a lower likelihood of consuming fruits and vegetables and a higher risk for chronic diseases (Nagata et al., 2019). These challenges necessitate specific focus to support the development of lasting health behavior patterns in a college environment as the choices made during this time significantly impact an individual's physical and mental well-being, academic performance, and long-term health outcomes (Reuter et al., 2021). Emerging adulthood, therefore, presents a unique window of opportunity for examining the impact of early parental influence and self-efficacy on dietary behaviors, considering the potential differing effects that may exist based on levels of food insecurity.

The purpose of the narrative review section of this paper is to describe factors that contribute to eating behaviors in college, particularly highlighting the associations between parental influences and eating behaviors in college, considering dietary self-efficacy as a mediator, with that pathway moderated by food security. While many studies have examined some combination of these factors, to this author’s knowledge, few studies include all of these factors, and none have developed a comprehensive model which states clear pathways among these four constructs. In the discussion, therefore, a model connecting these concepts will be proposed, which can be utilized in the design of future studies and interventions designed to support the development of healthy eating behaviors for children, potentially having long-term programmatic and policy health implications

Dietary Behaviors and Health Outcomes

Research indicates that unhealthy lifestyle habits, particularly poor dietary choices, are often established during young adulthood and these patterns of behavior can have long-term

implications for health and well-being (Dinger, 1999; Nelson et al., 2008; Scott, 2007; Zick et al., 2007). The nutritional content of fruits and vegetables supports healthy growth and development in children and adolescents, while diets rich in these foods are linked to the prevention of chronic illnesses, such as stroke, heart disease, diabetes, and certain cancers, thereby promoting overall health, across the lifespan (Boeing et al., 2012; Lange et al., 2021; Lee et al., 2022; Slavin & Lloyd, 2012; Wang et al., 2014). The World Health Organization recommends that to lower the risk of non-communicable diseases, adults should consume at least 400 grams of fruits and vegetables each day (World Health Organization, 2023) and the 2020–2025 Dietary Guidelines for Americans advise incorporating more fruits and vegetables into daily diets as part of healthy dietary patterns (Lee et al., 2022). This is roughly equivalent to five servings of fruits and vegetables daily. College students' diets tend to be lacking in essential components such as fruits, vegetables, and dairy products, while they often contain elevated levels of fat, sodium, and sugar (American College Health Association, 2022).

Dietary Patterns Among College Students

Young adults' dietary behaviors are significantly influenced by the food environments they encounter (Romero-Blanco et al., 2021), and individual and social circumstances play a substantial role in shaping their dietary choices (Whatnall et al., 2020). As young adults enter college, they confront numerous significant changes, including the newfound autonomy in making food choices (Freedman, 2010). Young adults who are in college often find themselves in a pivotal phase of life marked by irregular routines (Sengör & Gezer, 2019) and increased access to highly palatable foods (Romero-Blanco et al., 2021). College students may have an inclination towards eating in the absence of hunger and relying on easily accessible snack foods, particularly in dormitory settings where perishable fruits and vegetables may not be as feasible

due to irregular shopping patterns and a lack of refrigeration and cooking/food preparation utilities and instead rely on microwaves (LaCaille et al., 2011; Nelson & Story, 2009). While nutrient-dense non-perishable snack options like dried fruit exist and healthy prepared meals can be purchased in some grocery stores and kept in the dorm, these options are often less convenient and more expensive compared to easily accessible, palatable snacks like chips and candy.

Rate of Fruit and Vegetable Consumption Among College Students

A comprehensive scoping review of vegetable consumption among nearly 70,000 college students worldwide found that the majority do not consume vegetables as frequently or in quantities recommended by the World Health Organization, with college students in the United States reporting lower intake than students in other countries (Rodrigues et al., 2019). Research indicates that the majority of young adults, including college students, do not consume vegetables and fruits in quantities or frequencies that meet recommended guidelines (American College Health Association, 2022). In one study, individuals who are not enrolled in any educational institution and those attending two-year colleges reported having less frequent meals and a lower quality diet compared to their counterparts at four-year institutions (Nelson et al., 2008). Despite four-year college students having the healthiest reported diets in this study, their eating habits still fall short of national dietary guidelines (Nelson et al., 2009). Young adults report a range of barriers to fruit and vegetable consumption, including factors such as taste, time constraints, inconvenience, lack of knowledge on intake recommendations and preparation methods, the cost of fresh produce, and peer influences (Boek et al., 2012; Desphande et al., 2009; Larson et al., 2012; Pelletier & Laska, 2012; Sogari et al., 2018; Stok et al., 2018).

Studies have shown that students residing on campus consume more fruits and vegetables daily than students living off-campus (Adams & Colner, 2008; Brown et al., 2005; Brunt &

Rhee, 2008; Small et al., 2013), while other research indicates there is no noticeable difference in fruit and vegetable consumption between students living on campus and those living off campus (McLean et al., 2013). One study found that housing with food provision - dormitory, fraternity or sorority house, or a cooperative - may buffer the effects of these factors on students' fruit and vegetable intake, suggesting that the availability of food options is a key determinant of dietary quality (Mirabitur et al., 2016). However, several studies suggest that students living with their families tend to have higher intakes of fruits and vegetables than students residing on-campus or off-campus independently or with roommates (Amuta et al., 2016; Sharma et al., 2009), which may be attributed to the positive influence of family eating habits and the availability of healthy food options at home. Additional research into the effects of living arrangements in college on fruit and vegetable consumption is necessary.

There are mixed findings regarding age and year in school, with some studies reporting that upperclassmen and older college students consume fruits and vegetables more frequently than underclassmen and younger college students (Henley et al., 2023; Ramsay et al., 2017) while others suggest no significant differences (Driskell et al., 2005; Vilaro et al. 2018). Gender is found to be a significant predictor of fruit and vegetable consumption across many studies, with female college students generally consuming more fruits and vegetables than males (El Ansari et al., 2011; Mikkilä et al., 2004; Mirabitur et al., 2016; Ramsay et al., 2017; Rodrigues et al., 2019), though no difference has been reported in some studies (Small et al., 2013).

Racial disparities in the consumption of fruits and vegetables among college students exist and are influenced by a complex interplay of socioeconomic, cultural, and environmental factors - reflecting broader societal trends. Studies have shown that white and Asian or Pacific Islander students often report higher rates of fruit and vegetable intake compared to their Black,

Latine, and Native American counterparts (Adams & Colner, 2008; Odum & Xu, 2019). However, research such as that by Henley and colleagues (2021) indicates that these differences may not always be significant, suggesting more variability in dietary behaviors within different racial and ethnic groups. These patterns are consistent with those observed in the general population, indicating that the disparities among college students are reflective of wider societal issues.

Several factors contribute to these racial and ethnic differences in dietary intake. Socioeconomic status plays a critical role, as it affects access to healthy food options (Pechey & Monsivais, 2016). Lower-income neighborhoods, which disproportionately house racial and ethnic minority populations, often lack supermarkets that offer fresh fruits and vegetables (Ohri-Vachaspat et al., 2019). Instead, these areas may have convenience stores with limited and more expensive healthy options or require extensive travel to access affordable options, complicating healthy food access for those who seek it (Freedman, 2009; Sansom & Hannibal, 2021). This situation is further exacerbated in areas characterized by food apartheid and food swamps, where access to affordable and nutritious food is severely restricted, contributing to food insecurity (Burrell, 2022). Environmental factors, such as the availability of supermarkets and perceptions of the food environment, have been identified as key determinants of fruit and vegetable consumption, underscoring the role of the built environment in dietary choices (Liese et al., 2014). Longitudinal assessments have further demonstrated that disparities in healthy food access persist over time, particularly in low-income, high-minority communities, emphasizing the need for targeted interventions to improve food access in these areas (Ohri-Vachaspat et al., 2019).

Despite the known benefits of consuming nutrient-dense foods for health and well-being, including the reduction of chronic disease risks, young adults across demographic groups continue to fall short of meeting the recommended daily intake of fruits and vegetables. Addressing the multifaceted barriers to healthy eating among college students requires a comprehensive understanding of the socioeconomic, cultural, and environmental factors at play.

Limitations in Fruit and Vegetable Intake Literature

While the health benefits of consuming a high amount of fruits and vegetables are well-documented (Wang et al., 2014), there is a growing body of evidence distinguishing the health impacts and consumption patterns of fruits versus vegetables (Oyebode et al., 2014; see Appleton et al., 2016). While fruit and vegetable consumption are often combined into one variable in the literature, research has found that college students prefer fruit over vegetables (Ramsay et al., 2015), indicating it may be beneficial to examine fruit intake and vegetable intake as separate outcomes as well.

Due to their protein and fiber content, vegetables may offer enhanced health benefits, yet their consumption remains low (Slavin & Lloyd, 2012). Despite these advantages, fruit is often considered more palatable, and intake is generally higher than vegetables among individuals across the lifespan due to its sweet taste, softer texture, and convenience as a snack or dessert (Trudeau et al., 1998; Wardle & Cooke, 1999). Interventions aimed at increasing fruit and vegetable consumption often focus more on fruits and report greater success with fruit intake compared to vegetables (Appleton et al., 2016). This discrepancy underscores a significant gap in research, as few studies have specifically examined vegetable intake as a separate variable (Appleton et al., 2016; Rodrigues et al., 2019). This gap is notable because the factors influencing fruit consumption may not directly apply to vegetables. Most interventions targeting

an increase in vegetable consumption as a distinct food group have concentrated on younger children, indicating a need for broader and more targeted research efforts in this area (Appleton et al., 2016).

Longitudinal Effects on Eating Behaviors

Parental influence across early and middle childhood has been demonstrated to be highly influential in shaping development and behavioral patterns. According to social learning theory, the foundation for social cognitive theory which underpins this study, interaction styles learned in early to middle childhood are carried into adulthood by emerging adults (Whitbeck, 1994; Wood et al., 2017). Using the principles of socioecological models (Davison & Birch, 2001) which were developed out of Bronfenbrenner's ecological systems theory (Bronfenbrenner 1989; Kilanowski, 2017), a child's food consumption is the result of the interplay between various personal and environmental factors (Townsend & Foster, 2011). Using this theoretical framework, parents are the primary influencers of a child's dietary beliefs and choices (Branen & Fletcher, 1999; Davison & Birch, 2001; Savage et al., 2007) which have long-term effects on dietary behaviors across the lifespan (DuBois et al., 2022). These familiar interaction patterns are crucial for individuals in adapting to new situations and significantly impact their ability to navigate the numerous changes encountered during emerging adulthood (Wood et al., 2017).

The term 'food parenting practices' refers to both deliberate and inadvertent actions by parents that shape their children's dietary attitudes, beliefs, and behaviors (Orlowski et al., 2022; Vaughn et al., 2016). Extant literature has demonstrated that preferences for fruit and vegetables can be strengthened through repeated exposure in childhood (Anzman-Frasca et al., 2012; Birch, 1999; Osborne & Forestell, 2012) and use of appropriate feeding strategies with children to encourage consumption of fruits and vegetables (e.g., O'Connor et al., 2010; Ramsay et al.,

2014; 2015). Research underscores the powerful impact of food parenting practices, particularly restriction and pressure to eat, on children's dietary intake and their ability to regulate food consumption. For instance, studies have found that higher levels of parental control and pressure to eat are associated with lower fruit and vegetable intake and can disrupt children's short- and long-term eating behaviors (Savage et al., 2007). These practices also have an effect on long-term eating behaviors. The ability to make healthy eating choices necessitates an understanding and responsiveness to internal and external food cues (Booth, 1985) and the development of this ability may be interrupted by high levels of parental control over eating behaviors. While children demonstrate an ability to identify the effects of foods on their bodies and a preference for higher energy foods (Birch et al., 1990; Kern et al., 1993), this responsiveness weakens and use of cognitive strategies and reliance on external cues increases over time (Carnell & Wardle, 2009; Schachter, 1968). Therefore, higher levels of parental control over eating behaviors may interrupt the development of a child's ability to be responsive to internal food cues and an over-reliance on external cues.

Middle childhood - approximately 6-12 years old - is a critical time period for developing dietary behaviors (Balantekin et al., 2020) that are sustained into adulthood (Dubois, 2022), and therefore important to examine when considering lifespan health patterns and outcomes. Studies have demonstrated that the influence of parent-child interactions on the development of lasting dietary behaviors is most significant between the ages of five and eleven years old (Cislak et al., 2012), as during this period have the cognitive capacity to understand why healthy behaviors are important (Wall et al., 2012; Zeinstra et al., 2007) and are beginning to more intentionally use knowledge to direct their own behavior (Davis-Kean et al., 2009), while still largely engaging with food in settings constructed by adults. As children reach middle childhood, they begin to

engage more autonomously in the world – making decisions regarding their health independently, being able to prepare their own food more often, and eating outside of the purview of their parents (Bandelli et al., 2017; Decker, 2012). However, children in this age group are still largely dependent on the food and structure provided by their parents (Balantekin et al., 2020; Hanson et al., 2005). Elements of the home food environment, such as family meals and child involvement in food preparation, have also been linked to self-efficacy (e.g., Chu et al., 2013) and child eating patterns (e.g., Woodruff & Hanning, 2009).

Parental Influence on the Development of Dietary Patterns

Parents and caregivers hold a fundamental and lasting influence on the development of their children's consumption patterns, as they create and maintain the primary environment within which food is sourced, prepared, and consumed (Mitchell et al., 2013). Studies suggest parental influences, such as control (e.g., Barber, 1996), and parent-child communication (Miller-Day & Kam, 2010) in shaping child development. Research into parental knowledge and application of national dietary guidelines reveals that parents are generally informed on what constitutes a healthy diet for their children, though a substantial gap remains as to how to implement that diet effectively (Cluss et al., 2013; Hart et al., 2015; Schwartz et al., 2011; Variyam et al., 1999, Variyam et al., 2001).

These influences occur in the forms of both direct communication and also in feeding practices. The influence of parents and caregivers on the development of children's eating behaviors is of paramount importance, with their control and communication playing a pivotal role in shaping these behaviors. Feeding practices employed by parents are closely linked to their children's eating habits, as both long-term observations and experiments suggest that attempts to excessively regulate parental feeding may exacerbate undesirable eating behaviors in kids

(Scheinfeld et al., 2012). Moreover, the messages parents convey about their children's eating behaviors are often internalized and significantly impact health beliefs and dietary choices (Barnes et al., 2000; Kaplan et al., 2006). Effective parent-child communication regarding various health behaviors serves as a protective buffer against potential risks associated with engaging in unhealthy behaviors.

Bronfenbrenner's ecological system theory (1979) provides a valuable framework for examining development of eating behaviors, while authors of a more recent review of studies using this framework has recommended the evaluation of specific elements in Bronfenbrenner's Process-Person-Context-Time (PPCT) model for the application of ecological theory (Tudge, Mokrova, Hatfield, & Karnik, 2009). The current study employs Bronfenbrenner's Process-Person-Context-Time (PPCT) model to explore the long-term effects of controlling food parenting practices. This approach is grounded in the understanding that interactions between an individual and their immediate environment are crucial drivers of development, as posited by Bronfenbrenner & Morris (1998). Given that family interactions are pivotal and enduring within a child's developmental context, this research zeroes in on the role of parental influence, specifically restriction and pressure to eat. Pressure to eat refers to attempts to increase consumption of healthful foods such as fruit and vegetables" (Wardle et al., 2005) and is widely established as a correlate of eating behavior (Fisher et al., 2002; Galloway et al., 2006; Russell & Worsley, 2013). Similarly, restriction, which is the "practice of limiting access to foods such as sweets and fatty snacks" (Wardle et al., 2005) and is also associated with dietary patterns in childhood in an abundance of research (Carper et al. 2000; Clark et al., 2007; Faith et al., 2004). Both of these concepts fall within the domain of controlling food parenting practices (Hubbs-Tait

et al., 2008). The following sections delve into restriction and pressure to eat, shedding light on their established relationship with dietary behaviors.

Controlling Food Parenting Practices

A substantial body of research underscores the pivotal role of various parental practices in shaping their children's health-related behaviors over the lifespan (e.g. Harakeh et al., 2004) and childhood diet is widely established as a determinant of eating behaviors in adulthood (Mikkilä et al., 2004). Parental strategies linked to the development of healthy eating behaviors encompass strategies such as frequent exposure to novel food items, offering positive reinforcement, and modeling thoughtful consumption (Gibson et al., 2012; Wardle et al., 2003). However, not all parental feeding practices foster healthy eating behaviors. Research has demonstrated that parents who employ controlling feeding methods are potentially disrupting their children's ability to develop a capacity to recognize satiety and internal hunger cues (Birch & Deysher, 1986; Faith et al., 2004), which can result in eating in the absence of hunger and dysregulated eating (Birch et al., 2001; Birch & Fisher, 2000; Robinson et al., 2001; Sira & White, 2010). Excessive parental control over the timing, type, and quantity of food children consume can condition children to disregard their own hunger signals, which can result in excessive or insufficient eating (Costanza & Woody, 1985; Hubbs-Tait et al., 2008). Restriction and pressure to eat are controlling food parenting practices that have been extensively studied in the context of child eating behaviors. Restriction involves limiting access to certain foods, while pressure to eat involves encouraging or forcing children to eat more (Birch et al., 2001). A systematic review by Shloim et al. (2015) concluded that controlling feeding practices are associated with a lower intake of fruits and vegetables among children. Similarly, a meta-analysis by Yee and colleagues (2017) found that parental restriction was negatively associated

with children's fruit and vegetable consumption. These practices have also been associated with less healthy eating behaviors and lower fruit and vegetable consumption in adulthood (Galloway et al., 2006; Pearson et al., 2009).

Specifically, controlling food parenting practices associated with the development of unhealthy eating behaviors include restriction or reduction of child's snack or meal intake (Clark et al., 2007) and exerting pressure on the child to eat (Gregory et al., 2010). Several studies have demonstrated longitudinal effects as well, for instance, Birch and colleagues (2003) found maternal restriction of food for children aged five predicted eating in the absence of hunger four years later, with greater effects for children reported to be overweight at age five. This pattern of increased eating in the absence of hunger when faced with restriction is in line with research showing that as children grow, their eating habits become more influenced by environmental factors, such as the size of food portions (Rolls et al., 2000). Both dietary disinhibition and binge eating may be triggered by self-imposed eating restrictions (Herman & Polivy, 1975; Puhl & Schwartz, 2003). Although the exact causes of these eating issues are not fully understood, current research shows that eating in the absence of hunger, a key aspect of both disinhibited and binge eating, emerges in middle childhood among girls and is encouraged by maternal dietary restrictions (Birch et al., 2003; Carper et al., 2000; Cutting et al., 1999). This behavior could become particularly concerning for college students who have easy access to a variety of palatable foods in dining halls. However, additional research is needed to examine the maintenance of the effects of restriction over a greater timespan, such as into emerging adulthood, and their direct effects on rates of fruit and vegetable intake.

Restriction

Restriction refers to the "practice of limiting access to foods such as sweets and fatty snacks" (Wardle et al., 2005). Parents most often restrict their children's food intake when they are concerned that their child is overweight (Costanza & Woody, 1985; Crouch et al., 2007; Gregory et al., 2010; Webber et al., 2010), though research suggests parental perceptions of their children's weight status are often inaccurate (Carnell et al., 2005; May et al., 2007). An abundance of research has demonstrated that parental restriction of a child's snack or meal intake is associated with the development of unhealthy eating behaviors such as disinhibited eating and eating in the absence of hunger (Carper et al. 2000; Clark et al., 2007; Faith et al., 2004; Fisher & Birch, 1999;2000;2002). Several studies have demonstrated that limiting children's access to specific foods can increase their preference for and consumption of those foods once the restrictions are lifted (Fisher & Birch, 1999; Jansen et al., 2007). For instance, parents may unintentionally foster a preference for energy-dense foods in their children by restricting these foods and using them as a means to manage behavior, and therefore associating them with rewards. When parents restrict highly palatable foods, those foods actually become more desirable to their children. The reciprocal dynamism indicated in ecological systems theory and social cognitive theory are at play here, as parental restriction of certain foods and children's increased preference for them likely reinforce one another.

The restriction of certain foods by caregivers, typically those high in calories, fats, or sugars, tends to increase the appeal of these foods to children (Birch et al., 2003; Faith & Kerns, 2005; Ventura & Birch, 2008). Parental restriction of a desired food item leads to an immediate increase in children's consumption of that food, along with their comments, requests, and efforts to obtain it (Fisher & Birch, 1999; Rollins et al., 2015). Furthermore, a higher level of food restriction predicted higher rates of eating in the absence of hunger two to four years later (Birch

et al., 2003). Restrictive feeding practices predict higher rates of consuming food in the absence of hunger (Birch et al., 2003). These results have been reported to persist into adulthood (Birch et al., 2007).

However, there are mixed findings, with some reports of healthier eating habits associated with parental food restriction earlier in childhood (De Bourdeaudhuij, 1997; Gubbels et al., 2009). Several reviews of parental feeding practices found that moderate restrictions can be beneficial, as children of moderately restrictive parents consumed fewer calories, more fruits, and less fatty snacks and sweets and parental encouragement to eat nutritious foods promoted healthier dietary habits (Gibson et al., 2012; Mahmood et al., 2021). It should be noted that moderate restriction is defined as gradual limitations of certain food items, rather than outright forbidding of the item, in these studies.

Parents may assume that imposing dietary restrictions, controlling and monitoring food intake, and encouraging dieting will positively impact their child's health; however, negative outcomes related to those practices are reported in an abundance of literature. Studies have revealed links between parental food restriction and various deleterious eating behaviors, and attitudes (Van Diest & Tylka, 2010). Furthermore, such restrictions have been associated with dieting behaviors later in life (Francis & Birch, 2005), which are linked to range of unhealthy eating behaviors such as binge eating (Field et al., 2003; Polivy & Herman, 1985), breakfast skipping and lower fruit and vegetable intake (Neumark-Sztainer et al., 1996; Neumark-Sztainer & Story, 2007). Costanzo and Woody (1985) suggest that the degree to which parents exert control over their child's diet is influenced by their perceptions and anxieties about the child's susceptibility to obesity. This misalignment between parental intentions and actual outcomes, potentially influenced by parental messaging, could lead to a strained relationship with food

during early adulthood. When the focus is primarily on external cues like weight, individuals may engage in behaviors that do not contribute to long-term weight loss or maintenance.

Moreover, extensive research has shown that dieting behaviors in adolescents are associated with an increased risk of weight gain (Field et al., 2003; Neumark-Sztainer et al., 2006), indicating that dieting is also not an effective long-term weight management strategy. Instead, dieting can set the stage for poorer eating and physical activity behaviors over time. Dietary Restraint Theory suggests that relying on cognitive control over eating, as opposed to responding to physiological cues of hunger and satiety, can leave dieters vulnerable to uncontrolled eating when cognitive processes are disrupted (Hagerman et al., 2021). Therefore, even the intended parental goal of child weight loss or maintenance is not likely to be met by imposing restrictions and there are additional potential deleterious mental health and self-regulation consequences.

Pressure to Eat

Pressuring children to eat, which refers to "attempts to increase consumption of healthful foods such as fruit and vegetables" (Wardle et al., 2005) is also associated with a range of unhealthy eating behaviors. Pressure to eat is distinctly different from positive encouragement, which refers to communicating positively about multiple types of food while children and parents making joint decisions about what the child will consume (Lo et al., 2015). Similarly, pressure to eat is distinct from taste exposure, which describes the repeated exposure of novel food items to children and has been demonstrated to increase preference for a new food among young children (Birch, 1999). Pressure to eat is often employed when parents are concerned the child is not consuming enough healthy foods (Webber et al., 2010) or that the child is underweight (Gregory et al., 2010; Keller et al., 2006). Pressure to eat is also employed by

parents with low rates of fruit and vegetable consumption themselves and when children are exhibiting food neophobia (Wardle et al., 2005). The primary worry with children who have food neophobia is that their diet may become nutritionally deficient due to their reluctance to eat fruits, vegetables, and protein-rich foods (Cooke et al., 2003; 2006). However, similar to restriction, this practice of pressuring a child to eat is more likely to exacerbate the eating behaviors the parent is trying to change. There are likely reciprocal effects in which the parental pressure and child reluctance to eat reinforce one another (Gregory et al., 2010), as indicated in social cognitive theory and ecological systems theory.

Pressure to eat has been linked to lower preference for the target foods and lower rates of fruit and vegetable intake among children (Fisher et al., 2002; Galloway et al., 2006; Gregory et al., 2010; Osborne et al., 2012; Russell & Worsley, 2013). When caregivers exert pressure on children to consume certain foods, often those rich in nutrients, children may develop aversions to these foods due to negative experiences and associations, such as conflicts during meals (Birch et al., 2003; Galloway et al., 2006). When children are pressured to eat specific foods, they may develop a "cognitive aversion" to those items, associating them with the negative experience of being forced to eat (Batsell & Brown, 1998; Batsell et al., 2002). Consequently, the persistent application of pressure to eat could lead to an increase in children's picky eating behaviors. Similarly, Galloway and colleagues (2005), found that girls whose mothers applied greater pressure to eat at the age of seven exhibited more pronounced picky eating behaviors by the age of nine. Though few studies have yet examined the longitudinal effects of pressure to eat on eating behaviors among college students, in one study Ramsay and colleagues (2015) found that college students who reported pressure to eat vegetables in childhood also indicated lower

preference for vegetables than their peers. Additional research into these longitudinal effects is still needed.

Pressure to eat can also disrupt eating patterns. Two studies offer evidence suggesting that pressuring children to eat may undermine their ability to self-regulate their food consumption (Birch et al., 1987; Carper et al., 2000). Another study found that 5-year-old girls' perceptions of their parents' use of pressure to eat predicted the girls' restrained and emotional eating behaviors (Carper et al., 2000). In another study, approximately 70% of college students reported instances when they were pressured by a teacher or parent to eat food they disliked in childhood and still maintain a strong aversion to that food into adulthood (Batsell et al., 2002). Encouraging children to eat when they are not hungry is another form of control in child feeding. Studies have also found that pressure to eat correlates with both low responsiveness to satiety and greater eating in the absence of hunger (Birch et al., 2003).

Studies focusing on the eating-related messages from caregivers have revealed a connection with body dissatisfaction and disordered eating in young children. For instance, girls who perceived parental pressure to consume food showed an increase in their controlled eating, while those who felt their eating was restricted exhibited more uncontrolled eating behaviors (Carper et al., 2000) and a higher consumption of snack foods (Fisher & Birch, 1999). These relationships have been substantiated through longitudinal research. In one study, participants who reported their parents gave them restrictive messages in childhood were more likely to report they did not eat when hungry and continued eating even when full in college (Van Diest & Tylka, 2010). When young women gain independence from their caregivers, such as when they go to college, they often have more control over their food choices. This change can lead to individuals avoiding foods they were previously pressured to consume, particularly if they have

developed a dislike for these foods (Galloway et al., 2006). However, few studies have examined the longitudinal impact of these messages and practices regarding restriction and pressure to eat from childhood into emerging adulthood (Van Diest & Tylka, 2010).

Dietary Self-Efficacy and Eating Patterns in Emerging Adulthood

As indicated in both social cognitive theory and ecological systems theory, in order to support the development of healthy eating behaviors, understanding the sense of agency that develops out of the continuous interactions between intrapersonal and interpersonal experiences in various contexts in the development and maintenance of beliefs and behaviors is crucial. In this section, the role of self-efficacy in shaping eating behaviors among emerging adults, particularly college students, and its impact on their long-term health attitudes and behavior development will be explored. A wide range of consumption-related patterns have been linked to self-efficacy in young adult and college populations, underlining its critical role in fostering health behavior change and long-term health outcomes.

Self-efficacy, a central concept in Bandura's social cognitive theory, is seen as a key mechanism through which individuals exert control over their health behaviors (Bandura, 1977). It involves the confidence, knowledge, and skills needed to engage in specific health-related behaviors, and is closely tied to adopting and maintaining healthy lifestyle patterns (Bandura, 1998). Self-efficacy, a core concept within social cognitive theory, refers to an individual's belief in their capacity to achieve a particular outcome through actions within their control.

Self-efficacy is often proposed as a mediator between a range of intra- and interpersonal factors and health behaviors. Extensive research has identified self-efficacy as a key element in models that explains eating behaviors across various age groups, including the critical phase of young adulthood (DeWolfe & Shannon, 1993; Shannon et al., 1990; Sheeshka et al., 1993). This

concept is particularly relevant for young adults, as studies have shown that self-efficacy influences their dietary patterns (Ball et al., 2009; Larson et al., 2006; Strong et al., 2008). Several studies have found self-efficacy to explain the link between personal characteristics and social influences with eating behaviors across multiple different populations and timelines.

Research has consistently shown that self-efficacy plays a significant role in mediating the relationships between perceived parental behavior and adolescent dietary behaviors (Ma & Hample, 2018). Self-efficacy has also been identified as a significant factor in mediating the relationship between parenting style and adolescent fruit and vegetable consumption (Shermadou, 2018). Furthermore, self-efficacy also has been found to mediate the association between a range of food parenting practices and eating behaviors in adolescence (Kelly et al., 2017; Orlowski et al., 2022). Additionally, several studies have demonstrated that the indirect effect of higher parental self-efficacy, which is linked to parental feeding practices, on higher child fruit and vegetable intake is mediated by higher child self-efficacy (Zarychta et al., 2021). These findings underscore the importance of self-efficacy as a key mechanism through which parental influences, particularly those proximal processes or interactions around food, shape the development of eating behaviors in college students.

While self-efficacy is often understood as a general competence and confidence in one's ability to perform various behaviors effectively, it can also be domain-specific, such as in the context of health-related processes like dietary or physical activity behaviors. It is not a one-size-fits-all concept, particularly within the realm of health-related processes, such as dietary behaviors. This situation-specific confidence plays a pivotal role in behavior change, with Bandura (2006) emphasizing that it is not the actual ability but the individual's perception of their ability that determines the success of behavior change. Therefore, it is critical to examine

dietary self-efficacy as its own construct. However, there is an abundance of literature linking both general and task/domain specific self-efficacy - often without distinction - to fruit and vegetable consumption and other health behaviors.

Dietary self-efficacy is defined as an individual's perceived confidence to make healthy food choices (Person et al., 2012). Studies informed by social cognitive theory have found that greater consumption of fruits, vegetables, and various other healthful foods are associated with self-efficacy across general adult population (Anderson et al., 2007; Hagler et al., 2007; King et al., 2010; Shannon et al., 1990; Van Duyn et al., 2001) and young adults (Fernández et al., 2015; Kotecki et al., 2020; Stephens et al., 2017). Research indicates that there are gender differences in dietary self-efficacy, with female college students reporting higher levels of self-efficacy for healthy eating than males, but differences among racial subgroups were not significant (Stephens et al., 2017).

The relationship between dietary self-efficacy and fruit and vegetable consumption among college students and others in emerging adulthood is well-established, with numerous findings supporting the notion that higher levels of dietary self-efficacy are associated with greater consumption of fruits and vegetables (Fernández et al., 2015; King et al., 2010). In one study, experiencing high stress levels in combination with low dietary self-efficacy was linked to greater intake of fat and sodium among college students (Nastaskin & Fiocco, 2015). Conversely, students who reported low stress levels and high dietary self-efficacy had the lowest intake of these nutrients (Nastaskin & Fiocco, 2015). This pattern was also found in another study of college students in that lower perceived stress and higher dietary self-efficacy were found to be related to lower reported added sugar and higher diet quality scores (Kotecki et al., 2020). Furthermore, intervention studies have demonstrated the importance of general and

dietary self-efficacy in the intake of fruits and vegetables. Several studies have shown that interventions employing behavior change techniques enhances self-efficacy, which in turn led improved dietary habits, including a more balanced intake of fruits and vegetables (Kreausukon et al, 2012, Lhakhang et al, 2014, Luszczynska et al, 2007; Van Duyn, et al., 2001).

Parental Influence on Development of Dietary Self-Efficacy

The relationship between parental feeding practices and dietary self-efficacy is complex and multifaceted. As posited by social cognitive theory, health behavior change occurs in the context of reciprocal dynamic interplay between individual and environmental determinants (Bandura, 1998). Dietary self-efficacy, the belief in one's ability to regulate diet and eating habits, plays a crucial role in an individual's eating behaviors and dietary choices. Parental feeding practices, particularly restriction and pressure to eat during middle childhood, can significantly influence the development of dietary self-efficacy for an individual. The transition to college presents a critical period where young adults establish independence, including making their own dietary choices. The impact of parental feeding practices on dietary self-efficacy becomes evident as these young adults navigate their new-found autonomy. High levels of restriction and pressure to eat during childhood and adolescence may undermine dietary self-efficacy later in life, as these individuals may lack confidence in their ability to make healthy dietary choices independently (Costanzo & Woody, 1985). They might struggle with self-regulation, given their previous reliance on parental controls to dictate their eating behaviors.

Self-efficacy often is found to mediate familial influences and eating behaviors. Exerting control that limits a child's autonomy can impact their functioning and developmental progress (Barber, 1996; Hasebe et al., 2004; Hubbs-Tait et al., 2008). Negative parental control may foster an environment that limits a children’s capacity to build self-efficacy (Scheinfeld, 2012). Parents

who emphasize strict control, through the practices of restriction and pressure to eat may inadvertently hinder the development of self-efficacy in making healthier dietary decisions. This is because they are directing the child to rely on external cues in a controlled environment, which can diminish their capacity to confidently rely on internal hunger and satiety cues (Birch & Deysher, 1986). This parental control can also diminish the child's confidence in their ability to make healthy decisions. Hubbs-Tait and colleagues (2008) suggest that when parental control excessively infringes on a child's autonomy, particularly through practices like restriction and constant pressure, it can lead to children adopting unhealthy eating habits because it diminishes the children's confidence in their ability to choose foods for themselves. Consequently, they may not develop the necessary skills for making informed dietary choices.

This excessive parental control can contribute to eating-related issues and body dissatisfaction (Sira & White, 2010). A lack of understanding about the process of and reasons for eating healthy, combined with a lack of opportunities to make those decisions independently, can negatively impact children's perceived capacity regarding their ability to eat healthily (Hubbs-Tait et al., 2008), which demonstrates the impact of parental communication and feeding practices on self-efficacy. When individuals feel a lack of self-efficacy, they are less likely to engage in healthy eating behaviors (Bandura, 1998).

On the contrary, parents who provide freedom for their children to make food choices and engage in positive and open communication about health and nutrition may contribute to the development of greater self-efficacy in dietary decisions. This level of self-efficacy may extend its influence into emerging adulthood, a phase when many college students face the challenge of making their food choices, often in non-traditional meal settings. Understanding the role of dietary self-efficacy within the broader context of parental influence sheds light on the intricate

dynamics of dietary choices during this pivotal transitional phase. Therefore, self-efficacy may serve as a crucial mediator in the link between parental food influences and dietary patterns in young adults.

Limitations in Prior Dietary Self-Efficacy Research

Bandura (1997) emphasized that self-efficacy is predominantly specific to particular tasks, suggesting that to accurately predict behavior outcomes, self-efficacy assessments must be tailored to the specific behavior in question. Bandura (2006) cautioned that a high level of general self-efficacy does not necessarily translate into efficacy across all domains of behavior, challenging the assumption that general self-efficacy directly influences specific actions such as eating behaviors. This distinction introduces the necessity of utilizing the construct of diet self-efficacy, which reflects an individual's confidence in their ability to maintain dietary habits in the face of obstacles like stress or the availability of unhealthy food options. Dietary self-efficacy is thus posited as a more relevant measure for exploring the interplay between stress and dietary habits, emphasizing the need for specificity in self-efficacy assessments related to diet.

However, general self-efficacy is commonly used to predict dietary behaviors, and the literature on self-efficacy and eating behaviors often conflates various forms of self-efficacy, including general, healthy eating, weight loss/maintenance, nutrition, cooking, and dietary self-efficacy, without clear differentiation (Lombardo et al., 2021). This lack of specificity in language referring to conceptualization and measurement of self-efficacy related to dietary behaviors complicates the understanding of its impact. A study by Nastaskin and Fiocco (2015) is notable as it distinguished clearly between and measured both general and dietary self-efficacy among young adult college students, finding that it is dietary self-efficacy, rather than general self-efficacy, that correlates with nutrient intake. This finding underscores the importance of

distinguishing between general and specific forms of self-efficacy to better understand their respective influences on dietary behavior among college students, as well as supporting Bandura's theoretical premise that domain specific self-efficacy is more effective in changing behavior than general self-efficacy. Kedem and colleagues (2014) also highlight the scarcity of methodological studies in this area focusing on college-aged adults, despite the availability of survey validation studies for dietary self-efficacy and outcome expectations related to healthy eating among other demographic groups such as parents, low-income women, and parents with adolescents or children. However, other than a few notable exceptions (e.g., Nastaskin & Fiocco, 2015), the results are largely similar with general and various domain specific eating behaviors resulting in similar positive associations with expected health behaviors, and therefore included in the current review of literature.

Food Insecurity among College Students

Food insecurity, which is defined by the experience in which "access to adequate food is limited by a lack of money and other resources" (Coleman-Jensen et al., 2018, pg. 7)., is a pervasive concern in the United States. Food insecurity is inversely related to diet quality across a range of populations (Dixon et al., 2001; Hanson & Connor 2014) and is associated with a range of chronic health conditions including cardiometabolic disturbances, type 2 diabetes mellitus (Lariah, 2013; Seligman et al., 2010) and "hypertension, coronary heart disease (CHD), hepatitis, stroke, cancer, asthma, diabetes, arthritis, chronic obstructive pulmonary disease (COPD), and kidney disease" (Gregory & Coleman-Jensen, 2017, pg. 3). While a common assumption exists that college enrollment shields students from food insecurity, particularly due to the belief that college students are well-supported by their parents (Wolfson et al., 2021), recent research paints a different picture. The prevalence of food insecurity among college

students ranges from 31% to 47%, significantly exceeding the national average of 11.8% in the broader U.S. population (Nikolaus et al., 2020). This high prevalence of food insecurity during the college years carries substantial implications for dietary choices and overall health outcomes.

The USDA's framework for assessing food insecurity is widely recognized in academic research. It categorizes individuals along a spectrum of food security status, ranging from *high food security*, where individuals face no challenges in accessing sufficient food, to *very low food security*, characterized by repeated instances of disrupted eating patterns and reduced food intake. Individuals categorized as *marginally food-secure* may experience concern over having enough food but generally maintain access to their preferred foods. Meanwhile, individuals categorized as *low food security* might see a decline in the quality, variety, and desirability of their diet, though without significant reduction in food quantity. This classification system is essential for understanding the various levels of food access challenges faced by individuals (USDA ERA, 2023).

College students experiencing food insecurity report lower rates of fruit and vegetable consumption (Betancourt-Núñez et al., 2023; Boone et al., 2021; Bruening et al., 2017; El Zein et al., 2020; Farahbakhsh et al., 2017; Leung et al., 2019; Martinez et al., 2019; Payne-Sturges et al., 2018; Shi et al., 2021) which can have deleterious effects on short- and long-term health outcomes. Breakfast intake among college students experiencing food insecurity is reportedly lower than for their peers who are food secure (Çelik et al., 2023; Shi et al., 2021), which is tied to a range of other health behaviors and outcomes (Gibney et al., 2018; St-Onge et al., 2017. Unsurprisingly, food insecurity is also related to poor self-rated health among college students than their food secure peers (Farahbakhsh et al., 2017; Gallegos et al., 2014; Hiller et al., 2021; Martinez et al., 2019).

The effects of parental influence and dietary self-efficacy on eating behaviors may be different when comparing food-insecure and food-secure college students. Food insecurity in college may affect the relationship between parental influences and eating behaviors in several ways. For students who experienced restrictive feeding practices or pressure to eat in childhood, food insecurity may exacerbate tendencies towards disordered eating behaviors as they struggle to navigate the limited food environment of college (Savage et al., 2008; Zein et al., 2019)

Studies have found that food-insecure college students have lower cooking self-efficacy and less frequent food preparation behaviors compared to their food-secure peers (Boone et al., 2021; Knol et al., 2019). This lack of self-efficacy can lead to poorer dietary choices and reinforce unhealthy eating patterns that may have been influenced by parental practices in childhood (Knol et al., 2019). Conversely, food-secure students may be able to maintain healthier eating patterns due to higher dietary self-efficacy and better access to food (Knol et al., 2019). These findings demonstrate that food insecurity may affect not only the maintenance of dietary self-efficacy, but also the interactions between parental influence, and dietary self-efficacy, on eating patterns among college students, prompting an examination of all of these pathways.

Summary

The extant literature on eating behaviors highlights the salience of early food parenting practices, the construct of dietary self-efficacy, and the prevalence of food insecurity as pivotal factors influencing dietary patterns during emerging adulthood. The present study seeks to clarify the mechanism that connects these constructs, with a particular focus on how dietary self-efficacy mediates the association between childhood experiences of controlling food parenting practices and later dietary habits, and how this mediation is potentially weakened by the presence

of food insecurity. The formative period of early to middle childhood is widely recognized as a critical juncture for the establishment of health behaviors that carry long-term implications. Within this period, parental restriction and pressure to eat are of particular interest due to their enduring negative impact on the child's relationship with food.

The theoretical underpinnings of social cognitive theory suggest that such parental controls are instrumental in shaping dietary self-efficacy, which in turn, is a widely established predictor of eating behavior. Moreover, the ecological systems theory provides a framework for understanding how individual behavior is situated within and influenced by multiple environmental contexts. In the case of food insecurity, which is a pressing concern among emerging adults, the interaction between individual agency and environmental constraints becomes especially pronounced. Food insecurity is posited to exacerbate the challenges associated with maintaining healthy dietary patterns, thereby serving as a critical moderator in this model. In the following chapter, I will discuss how I draw upon the principles of ecological systems theory and social cognitive theory to guide the research questions and conceptualize the variables in the present study.

CHAPTER 3: THEORETICAL FRAMEWORK

This study is guided by both Bronfenbrenner's ecological systems theory and Bandura's social cognitive theory, which together provide a comprehensive framework through which the complex interplay of parental influence, dietary self-efficacy, and food insecurity on eating behaviors in emerging adulthood can be examined. Social cognitive theory provides insight into the role of self-efficacy in health behavior change, emphasizing the reciprocal nature of personal, behavioral, and environmental influences (Bandura, 1998). Ecological systems theory offers a broader perspective on how different environmental systems impact human development and behavior (Bronfenbrenner, 1979). Together, these theories guide our examination of how early parental feeding practices affect college students' eating habits and how these effects are mediated by self-efficacy and moderated by the food environment. This integrated theoretical approach sets the stage for understanding the complex factors that shape dietary behaviors during a critical life stage. In this chapter, these theories and how they inform the current study are investigated in more depth.

Bronfenbrenner's ecological systems theory

Bronfenbrenner's ecological systems theory (1979) provides a framework that encompasses a range of interacting factors that shape development. Bronfenbrenner proposed that human development occurs through an individual's experience in nested micro- to macro-level systems. By examining the various social contexts in which humans develop, Bronfenbrenner's (1979) ecological systems theory provides a comprehensive framework to analyze the development of eating patterns considering influences from multiple levels. Bronfenbrenner categorizes these contexts of child development into a series of nested systems, each embedded within the other, forming a concentric structure. This model is predicated on the

layering of different social contexts, through which a child progressively engages more extensively.

According to Bronfenbrenner's ecological systems theory, these nested systems include the microsystem includes interpersonal relationships and interactions; the mesosystem consists of interactions between different microsystems in which the individual is directly involved, such as one's peer group and family; the exosystem involves relationships and interactions that occur within an individual's outer network, such as one's extended family, workplaces of family members, or neighborhood, that indirectly affect the individual; the macrosystem encompasses overarching cultural, political, and economic systems in which the individual's world exists; and the chronosystem represents the temporal concepts of change and constancy that affect an individual (Bronfenbrenner, 1989; Bronfenbrenner & Morris, 2006). Individual characteristics work in conjunction with environmental factors to shape health behaviors (Bronfenbrenner, 1999; Sallis et al., 2008). Researchers have advocated for applying ecological models to the study of consumption patterns (Hemar-Nicolas et al., 2013; Wrobleski et al., 2018).

This theory evolved into the bioecological model (Bronfenbrenner & Ceci, 1994) which has undergone several transformations since its introduction. For example, the role of proximal processes, which are the enduring and persistent forms of interaction in the immediate environment, did not emerge until the 1990s. Bronfenbrenner shifted the focus from environmental influences to these developmental processes, emphasizing that development takes place through progressively more complex reciprocal interactions between the individual and the persons, objects, and symbols in their immediate external environment (Bronfenbrenner & Ceci, 1994). The bioecological model builds upon the ecological systems theory by further emphasizing the dynamic and interactive influences of these various nested systems on

individual human development. This model reconceptualizes the ecological systems that influence development by prioritizing the influence of the individual and further identifying inherent complexity within the individual and microsystem, such as disposition, resources, and demand, and the patterns that emerge and develop based on the combinations of these factors (Bronfenbrenner, 1989; Bronfenbrenner & Morris, 2006). According to this theory, development occurs ecologically, through dynamic interactions that occur regularly and become increasingly complex over time, across a set of core components - *Process, Person, Context,* and *Time* (Bronfenbrenner & Morris, 2006). Development, in this model, refers to biopsychological characteristic constancy and changes that occur within individuals across the lifespan and in generational shifts (Bronfenbrenner & Morris, 2006). Specifically, it is posited in this theory that the way in which *Processes* influence development diverge, based on individual biopsychological characteristics (*Person*), features of various environments (*Context*) and continuity, periodicity, and societal shifts (*Time*).

The bioecological model specifically emphasizes the concept of proximal processes, which are the interactions closest to the individual and are considered to be the most influential mechanisms guiding human development (Bronfenbrenner & Morris, 2006). This reconceptualized model also further develops the concept of reciprocal interactions across the systems by introducing Process as its own component, as well as Time. Time refers to (1) Microtime - the spectrum of continuity and discontinuity in which proximal processes occur, (2) Mesotime – the intervals of time periods in which proximal processes occur, and (3) Macrotime – the ways in which societal shifts occur generationally as a function of human development processes and outcomes throughout and across individual human lifespans (Bronfenbrenner & Morris, 2006).

Building upon ecological systems theory in which dynamic interactions across systems are seen as mechanisms of development, Process is introduced in the bioecological model as the primary component of the model, which is the interactions between context and the individual. In this model, proximal processes, or those nearest to the developing person, are considered to be the mechanisms guiding human development, with Time as another relevant dimension in which we see that as processes occur over time, they have multiplicative and reinforcing effects on developing behaviors (Bronfenbrenner & Morris, 2006). Proximal processes are the interactions closest to the individual such as parent-child interactions during mealtime (Bronfenbrenner, 1994). These processes are the core mechanisms that contribute to development as they take place over time. The influence of the different contexts and cognitive processes on behavior and development could change over time, reflecting the dynamic and reciprocal nature of these interactions.

In the context of the current study, the bioecological model provides a comprehensive framework for understanding the complex interplay between early parental influences, self-efficacy, the college food environment, and eating behaviors in college students. It emphasizes the importance of the proximal processes in childhood - specifically parental restriction and pressure to eat - as critical influences in an individual's development of related (dietary) self-efficacy and eating patterns later in life.

The current study focuses most specifically on examining processes within the microsystem - the interpersonal interactions with parents around food - and how it affects self-efficacy and eating behaviors. The methodology adopted for this study does not enable us to explore the additional levels, though it does provide a foundation for future research examining those interactions. Davison and Birch (2001) specifically apply the framework of ecological

systems theory to childhood overweight, and this framework can be applied when considering dietary intake as the outcome, rather than as a risk factor for overweight, which is what is being done in the current study. Davison and Birch (2001) assessed predictors of childhood overweight in combination with Bronfenbrenner's ecological systems theory. Within this framework, individual behaviors such as dietary habits, physical activity, and sedentary behaviors like television watching are identified as 'child risk factors' for overweight. These behaviors are situated within the microsystem, where immediate interactions with family and peers occur.

According to Davison and Birch (2001), parenting styles and family dynamics, which shape the development of child risk factors, are components of the microsystem as well. These include parents' own dietary and activity patterns, nutritional knowledge, child feeding practices, and the dynamics of peer and sibling relationships. The mesosystem encompasses the connections between these microsystems, such as the relationship between family practices and school experiences. School environment features, such as the presence of structured physical activity and the nutritional quality of school lunches, are part of the microsystem, while the broader community, demographic, and environmental factors — including parental work demands, ethnic background, and the neighborhood food availability — are elements of the exosystem and macrosystem. These larger systems influence the microsystem and mesosystem by shaping parenting practices and children's daily behaviors. The chronosystem, which encompasses the dimension of time, reflects the socio-historical contexts that may also impact these interactions and the child's development over time.

Temporal change is a critical dimension in this ecological approach (Bronfenbrenner, 2001) and the current study examines the influence of the proximal process of parental influence in childhood on the development of self-efficacy and eating behaviors later in life. The

biopsychological characteristics of an individual, or the Person, occupy a primary sequential position in the bioecological model, as they have the greatest capacity among the properties in this model to directly influence proximal processes across the lifespan (Bronfenbrenner, 1989). A set of behavioral social cognitive constructs were identified by Gaines and Turner (2009) as particularly relevant in the development of behavior. One particularly relevant construct in the area of consumption behaviors is self-efficacy, as it has been demonstrated to contribute to eating behaviors above and beyond other social cognitive constructs (e.g., Elmore & Sharma, 2014; Van Duyn et al., 2001). Self-efficacy is the belief that an individual holds regarding their capacity to achieve a specific outcome through actions within their control (Bandura, 2004). The current study seeks to uncover the extent to which parental influences during this time support and maintain the development of eating behaviors through their direct effects and indirect effects through dietary self-efficacy.

Social Cognitive Theory

Bandura provided a robust framework for understanding human behavior through the lens of social learning theory and its evolution into social cognitive theory. This theoretical approach has been used extensively for decades in the study of health behaviors (AbuSabha & Achterberg, 1997; Shannon et al., 1990; Sheeska et al., 1993). Bandura's social learning theory, introduced in the 1960s, posited that behavior is learned primarily through observation, imitation, and modeling. This theory was a significant departure from the behaviorist perspective, which emphasized direct reinforcement and punishment as the primary mechanisms of learning. Bandura suggests that cognitive processes play a crucial role in how individuals assimilate and replicate behaviors observed in others.

Social learning theory evolved into social cognitive theory by the mid-1980s, with Bandura expanding the scope of this theoretical perspective to incorporate a broader range of cognitive processes. Social cognitive theory maintains the core premise of social learning theory but places a greater emphasis on the role of cognitive factors in learning and behavior change. This theory is characterized by several key constructs, including reciprocal determinism, which highlights the dynamic and reciprocal interaction among personal factors, environmental contexts, and behavior. This principle suggests that not only do individuals shape their environments, but environments also shape individuals. Behavioral capability refers to the knowledge and skill required to perform a behavior effectively. Observational learning, or modeling, is the process of learning behaviors by observing others. Reinforcements are responses to a person's behavior that affect the likelihood of continuing or discontinuing the behavior. Expectations and expectancies involve the anticipated outcomes of behaviors and the value placed on those outcomes. Self-efficacy, as previously mentioned, is the confidence in one's ability to take action and persist in action despite obstacles.

According to social cognitive theory, development of behavioral patterns, which occurs as reciprocal dynamic interactions take place between an individual and their environment (Bandura, 1977; 1998). One of the unique features of social cognitive theory is the concept of self-efficacy, which is considered a critical determinant of how people think, motivate themselves, and behave. Self-efficacy is the belief an individual has in their capacity to effectively perform tasks and meet given expectations and is one of the primary mechanisms through which individuals may exert control over their health behaviors, according to social cognitive theory (Bandura, 1977). As posited by social cognitive theory, health behavior change occurs in the context of reciprocal dynamic interplay between individual and environmental

determinants (Bandura, 1998). Bronfenbrenner and Morris (2006) describe how younger individuals engage in interactive processes which support the development of their "ability, motivation, knowledge, and skill to engage in such activities both with others and on your own" (pg. 797).

Self-efficacy, therefore, is a principal characteristic to examine when considering dietary behaviors, because it is related to having that ability, motivation, knowledge, and skill which guides increased confidence and ability to engage in certain behaviors. Bandura (2004) suggests that knowledge of the benefits and risks related to behavior, as well as knowledge of individual capacity, are necessary preconditions for behavioral change. This behavioral change is maintained as individuals overcome challenges to the adoption of healthy lifestyle patterns through self-efficacy (Bandura, 2004; Gaines & Turner, 2009).

Bronfenbrenner and Morris (2006) similarly describe how younger individuals engage in interactive processes which support the development of their "ability, motivation, knowledge, and skill to engage in such activities both with others and on your own" (pg. 797) in the bioecological model. Self-efficacy, therefore, is a principal biopsychological characteristic to examine when considering dietary behaviors, because it is related to having that ability, motivation, knowledge, and skill which guides increased confidence and ability to engage in certain behaviors. Bandura (2004) suggests that knowledge of the benefits and risks related to behavior, as well as knowledge of individual capacity, are necessary preconditions for behavioral change. This behavioral change is maintained as individuals overcome challenges to the adoption of healthy lifestyle patterns through self-efficacy (Bandura, 2004; Gaines & Turner, 2009). In order to support the development of healthy eating behaviors, understanding the sense of agency that develops out of the continuous interactions between a child's intrapersonal and interpersonal

experiences in various contexts in the development and maintenance of beliefs and behaviors is crucial. Self-efficacy is a key contributor to variance in eating behaviors (Fitzgerald et al., 2013).

Parental feeding practices, such as restriction and pressure to eat, are critical examples of how social cognitive theory can be applied to understand long-term health behaviors. From a young age, children are subject to their parents' feeding strategies, which may include limiting access to certain foods or pressuring them to consume specific items. These parental practices can lead children to form associations between eating and external controls rather than internal cues of hunger and satiety, potentially disrupting their natural ability to regulate food intake (Savage et al., 2008).

As children transition to college, they begin to exercise more autonomy over their eating choices. However, the eating behaviors and attitudes shaped by their parents' influence during childhood can significantly impact their dietary patterns in college. For example, college students who experienced high levels of parental control over their eating may struggle with self-regulation and are at risk of overeating or developing disordered eating behaviors when they encounter the abundant and varied food environments on college campuses (Savage et al., 2007).

If parental influence during childhood has undermined a child's self-efficacy regarding their eating behaviors, it may lead to a lack of confidence in making healthy food choices independently. Conversely, if parents have fostered a sense of self-efficacy by allowing children to make choices and listen to their hunger and satiety cues, these children may be better equipped to maintain healthy eating behaviors in college (Costa & Oliveira, 2022).

Moreover, social cognitive theory’s principle of reciprocal determinism suggests that personal factors, environmental contexts, and behavior all interact dynamically to influence learning and behavior. In the case of eating behaviors, the college environment represents a new

context in which the behaviors learned during childhood will be tested and potentially modified. The college environment, with its unique social norms, food availability, and stressors, interacts with the individual's learned eating behaviors and can either reinforce or challenge them (Costa & Oliveira, 2022).

Role of Food Insecurity

These developmental processes could unfold but constraining factors can limit the extent and way in which these relationships occur for certain populations. Specifically, food insecurity may moderate the association between self-efficacy and the eating behaviors of college students. The moderating role of food insecurity on the pathway from parental influence to eating behaviors, via self-efficacy, is a critical aspect of this research. Food insecurity, which affects a significant portion of college students, can impede the ability to make healthy food choices, thereby attenuating the impact of self-efficacy and parental influence (Coleman-Jensen et al., 2021; McCoy et al., 2022). The current study, therefore, explores the direct and indirect effects of parental influence and self-efficacy on eating behaviors but also seeks to understand how these effects are conditioned by the larger environmental context of food availability and socio-economic factors. Specifically, in the current study, food insecurity is expected to affect the pathway between controlling food parenting practices and fruit and vegetable consumption, as well as the pathway between dietary self-efficacy and fruit and vegetable consumption.

Several studies have demonstrated that as adolescents transition to college, their dietary habits are less influenced by parents, and their food consumption changes. Therefore, the college food environment plays a significant role in determining the extent to which self-efficacy affects college eating behaviors, as this relationship will not occur to the same extent across different environments. Food insecurity may weaken the positive relationship between dietary self-

efficacy and healthy dietary patterns. Furthermore, food insecurity can attenuate the positive association between dietary self-efficacy and healthy eating patterns.

A student with high dietary self-efficacy may still face challenges in adhering to a diet rich in fruits and vegetables if they encounter financial constraints or lack access to healthy food options, underscoring the variability of dietary self-efficacy benefits across different student groups depending on their food security status. This suggests that the benefits of dietary self-efficacy on dietary patterns are not uniform across all students but may vary depending on their food security status. This dynamic interplay underscores the importance of considering the external context in understanding and promoting healthy eating behaviors among college students. By acknowledging food insecurity as a moderating factor, this research highlights the importance of considering external contexts in devising strategies to support dietary self-efficacy and foster healthier eating habits among college students.

Variable Conceptualization

Controlling Food Parenting Practices - Restriction and Pressure to Eat

Controlling food parenting practices are critical in shaping children's eating behaviors and are influenced by both direct communication and specific feeding practices. Restriction, in the current study, is conceptualized as the extent to which parents exert control over their child's food intake with the intention of limiting less healthy food options. This form of parental control is rooted in the expectation that such restrictions will lead to better health outcomes for the child. The pressure to eat subscale, on the other hand, assesses the degree to which parents pressure their child to eat more, often focusing on the consumption of healthier foods or ensuring sufficient caloric intake. In the current study, these subscales will be included as independent

outcomes due to their independent nature, but the combined subscore variable of controlling food parenting practices will be included as well.

From the perspective of social cognitive theory, these parenting practices are understood as a product of reciprocal determinism, where behavior is influenced by a dynamic interaction between personal factors, environmental influences, and the behavior itself. Parents' use of restriction and pressure to eat can be seen as strategies informed by their beliefs and expectations about the health consequences of their child's eating habits, which in turn shape their feeding practices. This aligns with findings from the Child Feeding Questionnaire literature, which suggests that parental beliefs and behaviors play a significant role in the development of children's eating patterns (Fisher & Birch, 1999; Savage et al., 2007).

Ecological systems theory further contextualizes these practices within a broader environmental framework. Bronfenbrenner's Process-Person-Context-Time (PPCT) model is employed to examine the long-term effects of parental influences on children's eating behaviors. This model underscores the importance of interactions between an individual and their immediate environment as crucial drivers of development. Controlling food parenting practices, such as restriction and pressure to eat, are situated within the microsystem of family interactions, which are pivotal within a child's developmental context. However, these practices are also shaped by broader ecological systems, including the exosystem, which encompasses factors like food marketing and availability, as well as the macrosystem, which includes cultural beliefs about health and diet. This comprehensive approach recognizes the multifaceted nature of food parenting practices and their impact on the development of eating behaviors (Bronfenbrenner & Morris, 1998; Vaughn et al., 2016).

Dietary Self-Efficacy

Dietary self-efficacy, deeply rooted in social cognitive theory, is conceptualized as an individual's belief in their capability to adhere to healthy eating behaviors. This belief is pivotal as it directly influences motivation, behavior, and the regulation of dietary habits. For this dissertation, dietary self-efficacy is operationalized through the healthy eating dimension of the Healthy Eating and Weight Self-Efficacy (HEWSE) scale, which includes seven items specifically designed to assess an individual's confidence in making healthful food selections (Wilson-Barlow et al., 2014).

Incorporating ecological systems theory, this research examines dietary self-efficacy within the broader context of the food environment. Ecological systems theory suggests that individual behaviors are shaped through interactions with various environmental systems. By utilizing the healthy eating factor of the HEWSE scale, this dissertation explores how personal beliefs about dietary capabilities are influenced by and interact with environmental factors such as food availability, social norms, and food insecurity, ultimately affecting dietary behaviors among college students.

The decision to focus solely on the healthy eating subscale of the HEWSE scale, excluding the weight efficacy component, stems from a critical examination of the relationship between weight control and health outcomes. Recent literature suggests that the emphasis on weight control, including losing and maintaining weight, may not guarantee long-term health benefits and could potentially have deleterious impacts on a range of health behaviors and outcomes, and may actually lead to increased weight gain over the long-term (Memon et al., 2020; Tylka et al., 2014). Focusing on dietary self-efficacy rather than weight loss/maintenance self-efficacy is particularly crucial for college students due to its potential impact on their overall health and well-being.

Dietary self-efficacy revolves around beliefs in one's ability to adopt and maintain healthy eating behaviors, such as consuming fruits and vegetables regularly. An example item from the dietary subscale of the HEWSE scale is “I am able to consume fruits and vegetables in most of my meals”. This concept emphasizes behavioral changes related to food choices rather than solely focusing on achieving or maintaining a specific body weight. In contrast, weight loss/maintenance self-efficacy pertains to confidence in one's ability to reach and sustain an ideal body weight, which often involves restrictive dietary practices and can lead to unhealthy relationships with food and body image. An example item from the healthy weight subscale is “I have confidence that I can attain and maintain my ideal weight”. Without additional information regarding the participant’s perception of their ideal weight and how they are attaining it, this item does not give us information about health behavior - in contrast to the dietary item which focuses on the relatively universal concept of eating fruits and vegetables as health promoting.

For college students, who may already face academic and social pressures, the emphasis on weight-related self-efficacy can exacerbate stress and contribute to the development or exacerbation of eating disorders. By prioritizing dietary self-efficacy, individuals can focus on fostering positive eating habits and attitudes towards food, promoting a healthier relationship with nutrition and overall well-being. This approach acknowledges that health is multifaceted and extends beyond mere weight management, aligning with the diverse needs and challenges faced by college students. By encouraging dietary self-efficacy, interventions and support systems can better address the holistic health needs of this population while minimizing the risk of harmful outcomes associated with an exclusive focus on weight-related goals.

Food Insecurity

Food insecurity within the college student population is conceptualized as a complex condition that affects students' ability to perform behaviors influenced by previous parental practices and their current dietary self-efficacy. In this study, food insecurity is hypothesized to moderate the relationship between self-efficacy and healthy food choices. Specifically, it is characterized by limited access to sufficient and nutritious food, which may constrain students' ability to engage in desired dietary behaviors, potentially diminishing the influence of self-efficacy and parental practices in environments where food choices are limited due to food insecurity.

Ecological systems theory provides a framework for understanding food insecurity as an issue that transcends individual circumstances, encompassing interactions with various environmental systems. Within this theory, the experiences of food insecurity among college students are situated within the microsystem of their immediate environment, which includes the college campus and its resources. However, the influence of broader systems is also acknowledged, such as the exosystem, which involves economic conditions and food policies that affect food availability and affordability, and the macrosystem, which comprises societal attitudes and cultural norms regarding food access and security

The operationalization of food insecurity in this study is informed by the Awareness Subscale of the College Student Food Insecurity (CSFI) survey instrument (Wright, 2022). This subscale is designed to capture the awareness dimension of food insecurity, reflecting students' recognition of the challenges associated with obtaining nutritionally adequate and safe foods in socially acceptable ways. The Awareness Subscale items are intended to reflect situations such as depleting a food supply without the means to replenish it, experiencing anxiety about meal affordability, or consuming a poor-quality diet due to financial constraints. By utilizing this

subscale, the study aims to capture the subjective experience of food insecurity among college students, which is essential for comprehending the full scope of its impact on this population and for guiding the development of targeted interventions and policies

Fruit and Vegetable Intake

Fruit and vegetable intake is a pivotal indicator of dietary quality and overall health behaviors, serving as the outcome variable in this study. The assessment of daily fruit and vegetable consumption among participants is conducted using a scale that categorizes intake into six categories: 0, 1, 2, 3, 4, and 5 or more servings per day. Due to evidence suggesting differential consumption rates of fruits versus vegetables (Trudeau et al., 1998), fruit and vegetable intake are assessed separately in this study.

The conceptualization of healthful eating varies across studies, with definitions encompassing the frequency of eating snacks and large meals, dietary quality, or adherence to dietary recommendations for grains, fruits, vegetables, and micronutrients. Therefore, it is posited that employing a measure based on fruit and vegetable intake is advantageous due to its simplicity in administering and interpreting, as well as its non-controversial nature in terms of its contributions to an overall healthy diet. This rationale underpins the decision to focus on fruit and vegetable intake as the focal outcomes in the current study, aligning with the literature that frequently employs this measure in college populations.

Summary

In summary, this study aims to investigate how the interplay of parental food influences, dietary self-efficacy, and the college food environment shapes the dietary patterns of college students. It takes a holistic approach based on the bioecological model and social cognitive theory, considering the dynamic relationships within various contexts and the enduring impact of

childhood experiences on emerging adulthood dietary patterns. The present study draws upon social cognitive theory which posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior. This theory emphasizes the role of self-efficacy in influencing individuals' ability to make dietary choices and maintain specific eating behaviors, which is influenced by food parenting practices such as restriction and pressure to eat in childhood. Food insecurity is considered as a contextual factor that can influence the effects of dietary self-efficacy on eating behaviors by either facilitating or constraining food choices. This dissertation examines how the food environment may interact with self-efficacy and how this interaction may manifest differently across various contexts.

CHAPTER 4: METHODOLOGY

Participants

Participants in the current study included 278 individuals who were actively enrolled in a college or university at the time they completed the survey. The age of participants ranged from 18 to 60 years, with a mean age of 21.31 years (SD = 2.62) and a median age of 20 years. A majority of the respondents (90.3%) fell within the 18 to 25-year age bracket. The sample was predominantly undergraduate students (98.9%), with 36 freshmen (12.9%), 69 sophomores (24.8%), 75 juniors (27.0%), 77 seniors (27.7%), 18 fifth-year or higher (6.5%), and 3 pursuing graduate or professional degrees (1.1%).

Regarding gender identity, 157 respondents (56.5%) identified as female, 104 (37.4%) as male, and 17 (5.4%) as non-binary or a third gender. A small number, 2 respondents (0.7%), chose 'prefer not to say.' In terms of race/ethnicity, over one-third of the participants selected 'White (non-Hispanic/Latine)' (n = 107; 38.5%) as their race/ethnicity, followed by 'Asian or Asian American' (n = 84; 30.2%), 'Hispanic/Latine' (n = 30; 10.8%), 'Black or African American' (n = 25; 9.0%), 'Multiracial' (n = 19; 6.8%), 'Middle Eastern' (n = 5; 1.8%), , and 'Native Hawaiian or Other Pacific Islander' (n = 1; 0.4%). Three participants selected 'Other,' with two specifying 'Jewish' and one specifying 'American' and three participants indicated ‘Prefer not to say’.

Procedure

After obtaining approval from Cornell University's Institutional Review Board, this study's participants were recruited through the SONA system at Cornell and the Prolific online platform. The SONA system enabled the enrollment of Cornell students across various departments, offering course credit as an incentive. Prolific complemented this by attracting a

wide-ranging participant pool from outside the university. Eligibility for the study was limited to students actively enrolled in a college/university in the United States, aged 18 and above. Those not actively enrolled in a college/university in the United States or under 18 were excluded. Participants from the Human Ecology department received SONA credit after completing the survey and participants on Prolific received $2.00 after completing the survey. Participants who did not complete the survey received $0.50. Both recruitment methods adhered to IRB-approved ethical standards for exemption from both Cornell University and Syracuse University, ensuring informed consent and appropriate participant selection, thus enhancing the study's validity and generalizability.

Participants completed a 110-question anonymous survey with 11 subscales with questions written at a high school level of English using the Qualtrics survey platform. The data collection for this dissertation was part of a larger data collection effort with a team at Cornell University. Six subscales (40 total questions) out of the 11 subscales (110 total questions) were used for the current study. See Appendix C for the survey items used from this dataset for the current study and see Table 1 for the list of constructs, sources, items, and scoring. A web-based approach was used to increase reach among college students who are likely familiar and comfortable with the format. The use of this format also helped to increase participant confidentiality by allowing them to complete it in the place of their choice with privacy, rather than a classroom or other public space. To increase confidentiality, no identifiable information was collected and the data is being maintained electronically through Qualtrics. To minimize the potential for contingency biases in responses to subsequent questionnaires, all participants were asked to complete the questionnaire in a consistent sequence.

Eligibility to participate in the study required that respondents were actively enrolled in a college or university and age 18 or older. Informed consent was administered at the outset of the Qualtrics survey, featuring a mandatory response question for participants to express their consent and declare that they met the eligibility criteria. The individuals who did not agree to consent or declare they met the eligibility criteria were directed to the end of the study, while participants who provided consent were given the option to proceed with their participation. The use of an online survey platform helped to ensure that the survey was accessible from most types of electronic devices. Survey respondents took, on average, 18 minutes to complete the survey. All studies carried out in this research received approval and oversight from the Institutional Review Board at Cornell University. Essential documentation, along with all questionnaires, were submitted and received authorization before the commencement of the study.

Measures

Controlling Food Parenting Practices

Participants were prompted to think back to their experiences in childhood through middle school and indicate their recollection of how often their parents engaged in these controlling food parenting practices. This retrospective approach allows for the assessment of perceived parental feeding practices and their potential long-term impact on current dietary behaviors. There is precedent in the literature for the use of adults' recollections regarding childhood dietary and feeding experiences (Branen & Fletcher, 1999; Ellis et al., 2016; Ramsay et al., 2015; Unüsan, 2006). While there is some concern that these adult recollections may not accurately portray feeding experiences, it has been argued that perceptions of childhood experiences shape the development and attitude and behavior more than actual experiences (Kelly, 1955). On the other hand, it has also been argued that emerging adults’ cognitive ability

to reflect on their experiences may increase the accuracy of their recollection of the experience compared to the reports of children and adolescents (Santrock, 2008). Therefore, several different perspectives support the premise that these recollections from college students about their feeding experiences have significant implications for their current behaviors, warranting further investigation. By adapting the Restriction subscale (Scheinfeld, 2012) and Pressure to Eat subscale (Birch et al., 2001) for retrospective reporting, the study acknowledges the role of early parental feeding practices as reported by adult participants in shaping their current dietary self-efficacy and behaviors.

Restriction

Parental restriction was assessed using the Restriction created by Scheinfeld (2012). Scheinfeld (2012) notes that most restriction measures are designed for parental response and therefore created a 7-item scale to measure the child's experience of parental restriction, retrospectively. Participants were presented with a series of statements in a matrix format starting with the stem "Please choose the level of frequency that best reflects your experience in childhood through middle school" which I created. Responses to these statements were recorded on a 5-point Likert scale, ranging from 1 (never) to 5 (always) to indicate their recollection of the frequency of these occurrences. Sample items include: "My parents limited the number of servings I had at mealtime" and "My parents kept track of the amount of sweets I ate (candy, ice cream, pies, pastries)," and "Food was hidden from me, or kept out of my reach". Scores from this scale were averaged to create a composite score for restriction. Higher scores on this subscale indicate recollection of a higher level of parental restriction in childhood. Overall reliability was high (seven items, Cronbach's $\alpha = .89$) which is comparable to prior work (Cronbach's $\alpha = .87$) (Scheinfeld, 2012).

Pressure to Eat

For pressure to eat, I adapted the pressure to eat items from the Child Feeding Questionnaire (CFQ) (Birch et al., 2001) to reflect the experiences from the now young adult child's perspective, following Scheinfeld's (2012) example. Participants were presented with a series of statements in a matrix format starting with the stem in "Please rate how you much you agree that the statement reflects your experience in childhood through middle school." Responses to these statements were recorded on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) to indicate their recollection of the frequency of these occurrences. Sample items include: "My parents always pushed me to eat all of the food on my plate" and "If I said 'I'm not hungry', my parents tried to get me to eat anyway." Scores from this scale were averaged to create a composite score for pressure to eat. Higher scores on this subscale indicate recollection of a higher level of parental pressure to eat in childhood. Overall reliability was high in the current sample (four items, Cronbach's $\alpha = .84$) and comparable to prior work (Cronbach's $\alpha = .86$ (Berge et al., 2016). Pressure to eat and restriction were then averaged to create the Controlling Food Parenting Practices composite variable.

Dietary Self-Efficacy

Drawing on the principles of Social Cognitive Theory and its emphasis on the role of self-efficacy in behavior regulation, the consumption of healthy foods subscale of the Healthy Eating and Weight Self-Efficacy (HEWSE) scale (Wilson-Barlow et al., 2014) was selected to measure dietary self-efficacy. This subscale was conceptualized to assess an individual's confidence in their ability to engage in healthy eating behaviors. Participants were presented with a series of statements related to their confidence in making healthy food choices, such as "I am able to consume fruits and vegetables in most of my meals" and "I am able to eat a variety of

healthy foods to keep my diet balanced." These statements are designed to capture the essence of dietary self-efficacy, with broad enough language to make sure they are applicable in a range of situations and for people from diverse backgrounds.

Responses to these statements were recorded on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The consumption of healthy foods subscale of the HEWSE scale demonstrated strong psychometric properties, with a reported Cronbach's alpha of .81, indicating a high level of internal consistency (Wilson-Barlow et al., 2014). This reliability confirms the subscale as a dependable measure of dietary self-efficacy. Additionally, the test-retest reliability of this subscale was established among a subset of participants, ensuring its stability over time. Scores from the consumption of healthy foods subscale were averaged to create a composite score for dietary self-efficacy. Higher scores on this subscale indicate a greater level of confidence in maintaining healthy eating behaviors. Overall reliability was high (seven items, Cronbach's $\alpha = .93$) and comparable to prior work (Cronbach's $\alpha = .81$) (Wilson-Barlow et al., 2014).

Food Insecurity

Food insecurity is measured with the Awareness Subscale of the College Student Food Insecurity (CSFI) survey instrument, which is designed to capture the nuances of food insecurity as experienced by college students (Wright, 2022). This subscale is particularly focused on the awareness dimension of food insecurity, which includes understanding and recognizing the challenges associated with obtaining nutritionally adequate and safe foods in socially acceptable ways.

The CSFI instrument adapts the USDA 6-Item Short Form of the Household Food Security Scale, allowing for a more nuanced measurement of food insecurity on a 5-point Likert

scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Sample items include “I have skipped meals because I didn’t have enough money for food” and “I could not afford to eat balanced meals”. Scores from this scale were averaged to create a composite score for food insecurity. Overall reliability was high in the current study (five items, Cronbach’s $\alpha = .93$) and comparable to prior work (Cronbach’s $\alpha = .79$) (Wright, 2022).

This adaptation provides continuous data that can be analyzed to determine the prevalence and degree of food insecurity among college students. The use of this scale is informed by the need for a valid and reliable measure that can be applied nationally, addressing the gap identified in multiple studies regarding the lack of consistent measurement instruments for this population (Laska et al., 2020).

Fruit and Vegetable Intake

Fruit and vegetable intake is operationalized in this study as a key indicator of dietary behavior, specifically focusing on the daily consumption levels of these food groups. The operationalization involves two self-reported items, one assessing fruit intake and the other assessing vegetable intake, with participants indicating the number of servings they consume on a typical day. This approach aligns with previous research that has validated the use of a two single items measure (one for fruit and one for vegetables) as a sufficient indicator of fruit and vegetable intake among similar populations, such as college students.

The utilization of this two-item measure is supported by its simplicity and proven effectiveness in capturing dietary intake patterns. It provides a quick assessment that correlates well with more extensive dietary assessments, making it a practical tool for large-scale surveys and interventions aimed at improving dietary habits. The measure's validity is further supported by its frequent use in the literature (e.g., Mirabitur et al., 2016), where it has been shown to be an

adequate predictor of overall diet quality and a useful metric for public health research. The first item asks “How many servings of fruit do you eat on a typical day?” and the second item asks “How many servings of vegetables do you eat on a typical day?” Response options include 0, 1, 2, 3, 4, and 5 or more. Higher total scores represent higher intake of fruit and vegetables. Average level of daily fruit consumption was M = 2.32, SD = 1.06. Average level of daily vegetable consumption was M = 2.65, SD = 1.18. The variable daily fruit and vegetable consumption (*M* = 4.97; *SD* = 2.02) was created by summing these variables.

Table 1: *List of Constructs, Sources, Items, and Scoring*

Construct	**Subdomain**	**Source**	**Scoring**
Controlling Food Parenting Practices	Restriction	Restriction (Scheinfeld, 2012)	7 items, Likert Scale 1-5; average
	Pressure to eat	Pressure to eat - modified subscale of CFQ (Birch et al., 2001)	4 items, Likert Scale 1-5; average
Dietary Self-Efficacy		Healthy Eating Self-Efficacy Subscale (Wilson-Barlow et al., 2014)	7 items, Likert Scale 1-5; average
Food Insecurity		Food Insecurity Awareness (Wright, 2022)	5 items, Likert Scale 1-5; average
Fruit Consumption		“How many servings of fruit do you eat on a typical day?” (Peltzer & Pengpid, 2015)	2 items, 0-5+; summed
Vegetable Consumption		“How many servings of vegetables do you eat on a typical day?” (Peltzer & Pengpid, 2015)	2 items, 0-5+; summed

Analytic Procedures

Construction of the Sample

Of the 400 participants who took the survey, six did not meet the eligibility criteria because they were not actively enrolled at a university or college in the United States and 78 did not meet the age requirement. All 122 cases were therefore removed from the data set. A missing values analysis was conducted, and it was determined that 38 participants started the survey but stopped before completing the demographic items. The 84 ineligible participants and the 38 participants that did not complete any subscales were removed from the dataset, resulting in a final sample of 278 participants. All preliminary analyses were conducted using IBM SPSS, version 29. The PROCESS macro for SPSS version 29, 4.3.1 (Hayes, 2022) was used to test the mediation and moderated mediation models. Data was screened for missing values, and outliers. The mean was imputed for missing items. Composite scores were then calculated for each of the subscales.

Data Screening

No errors were observed in this data set when screening the data. Minimum and maximum values were checked to verify that they were within the expected range and a box plot analysis was used to examine potential outliers. After examining the potential outliers, all data points were retained as no outliers were found.

Missing values

Mean imputation was used for these cases of missing item responses by substituting the missing data with the mean from the available data. Two responses were missing for age. In both age cases, the median (Mdn = 20) was substituted for missing item responses. For the variables of interest, it was determined that 70% of item responses were needed in order to retain the variables and calculate the average score. One response was missing for one participant for one food insecurity item, which is an 80% response rate for that participant and therefore it was

appropriate to impute the mean. In this case, the scale mean (M = 1.58) was substituted for the missing value. For the dietary self-efficacy scale, five items were missing two responses, and one item was missing two responses in the dietary self-efficacy scale, respectively resulting in 71.42% and 85.71% response rates, which are appropriate for retention of these cases and mean imputation. The scale mean (M = 3.53) was then imputed for each of these missing values.

Transformations

Composite scores were computed by averaging item responses for each scale: Dietary Self-Efficacy, Food Insecurity, Restriction, and Pressure to Eat. Fruit intake is a single-item measure and Vegetable Intake is a single item measure, which were summed to create Fruit and Vegetable Consumption. Dummy variables were created for categorical variables, including gender identity, race/ethnicity, and year in school and some categories were collapsed within these variables. For race/ethnicity, the categories were collapsed by combining 'Middle Eastern' (n = 5), Multiracial (n = 19), Native Hawaiian or Other Pacific Islander (n = 1), Other: Jewish (n = 2), American (n = 1), and Prefer not to say (n = 3) into one category of 'Other Race/Ethnicity'. Therefore, the final categories for the race/ethnicity variable included 'Asian or Asian American' (n = 84), 'Black or African American' (n = 25), 'Hispanic/Latine' (n = 30), 'White (Non-Hispanic/Latine)' (n = 107), or 'Other Race/Ethnicity' (n = 31). For year in school, the categories were collapsed by combining 'freshman' (n = 36) and 'sophomore' (n = 69) to create 'Underclassmen' and 'junior' (n = 75), 'senior' (n = 77), and '5th year or higher undergraduate' (n = 18) to create 'Upperclassmen'. Therefore, the final categories for the year in school variable include 'Underclassmen' (n = 105), 'Upperclassmen' (n = 152), and 'Graduate or Professional Degree' (n = 3).

Testing Assumptions

Prior to performing a moderated mediation analysis, assumptions for linear regression were tested (Clement & Bradley-Garcia, 2022). Testing these assumptions involves ensuring the independence of observations, relationships among variables are linear, homoscedasticity is exhibited in error values, no multicollinearity is found among the variables, and assessing that error values follow normal distribution. After creating histograms and boxplots and scanning all data for outliers, I chose to retain all data points.

Preliminary Analyses

Descriptive statistics were calculated for all variables and the Shapiro-Wilk normality test was used to check for data normality. Bivariate Pearson correlation analyses were conducted to assess correlations across controlling food parenting practices and the subdomains of restriction and pressure to eat independently, dietary self-efficacy, food insecurity, fruit consumption, and vegetable consumption independently. See Table 3 for correlations.

Exploratory analyses were conducted to assess the composite variable of controlling food parenting practices, which was the average of restriction and pressure to eat, as a predictor variable. It was decided to include the overall construct of controlling food parenting practices as well as the subdomains of controlling food parenting practices independently, which reflects findings in the literature that restriction and pressure to eat are separate domains within controlling food parenting practices (Birch et al., 2001; Costanzo and Woody, 1985).

Data Analyses

In order to address the second research question, the mediating role of dietary self-efficacy between controlling food parenting practices and vegetable consumption was examined, controlling for age, gender, race/ethnicity, and year in school. It was hypothesized that dietary

self-efficacy would mediate the associations between (a) controlling food parenting practices, (b) restriction, and (c) pressure to eat with (a) fruit consumption, and (b) vegetable consumption.

However, pressure to eat was not included as a predictor variable due to its non-significant association with fruit consumption, vegetable consumption, and dietary self-efficacy in the bivariate correlation analyses. Therefore, the hypothesized mediation model was tested in four separate models, examining the mediating effect of dietary self-efficacy on the pathway of (1) controlling food parenting practices and fruit consumption, (2) controlling food parenting practices and vegetable consumption, and (3) restriction and fruit consumption, and (4) restriction and vegetable consumption.

To test the mediating effect of dietary self-efficacy, mediation analyses were conducted using the PROCESS macro model 4 for SPSS (Hayes, 2022) to identify and explicate the relationship between the independent variables and the dependent variable, which may be explained by the mediating variable, dietary self-efficacy. The PROCESS macro is a tool designed for path analysis that employs ordinary least squares (OLS) regression to analyze continuous outcomes (Hayes, 2022). A bootstrap estimation approach with 5000 samples was performed to evaluate β-coefficient with 95% confidence intervals. Age, gender, race/ethnicity, and year in school were included as covariates in all regression models and mediation analyses. All p-values were two-tailed and p-values < 0.05 were considered statistically significant.

In order to address the third research question, moderated mediation models were then tested for the models in which significant mediation was found, further exploring the moderated indirect effect of food insecurity in this model. It was hypothesized that food insecurity would moderate the mediation effect of dietary self-efficacy on fruit consumption and vegetable

consumption, with the indirect effect of dietary self-efficacy being weaker among college students who experience higher levels of food insecurity.

Moderated mediation is used to examine whether a moderator influences the magnitude of an indirect effect (James & Brett, 1984; Preacher et al., 2007). A moderated mediation occurs when the mediation relationship depends on the level of the moderator (Preacher et al., 2007). To test the conditional indirect effect of food insecurity, moderated mediation analyses were conducted using the PROCESS macro model 14 for SPSS (Hayes, 2022). When testing restriction as an independent variable, pressure to eat - was entered into the model as a covariate, in order to control for the effects of pressure to eat in the restriction model, as they are subdomains of the controlling food parenting practices. Age, gender, race/ethnicity, and year in school were treated as concomitant variables in these analyses and therefore also entered as covariates. A bootstrap estimation approach with 5000 samples was again performed to evaluate β-coefficient with 95% CI. In line with Aiken and colleagues (1991), the conditional indirect effect was examined at one standard deviation above the mean, at the mean, and at one standard deviation below the mean for food insecurity, to determine if the slopes within the regression differed from zero for high and low values. All p-values were two-tailed and p-values <0.05 were considered statistically significant.

CHAPTER 5: RESULTS

In this chapter, descriptive statistics for the variables of interest are presented. Next, preliminary findings, specifically the findings of bivariate Pearson correlations of the variables of interest - controlling food parenting practices, restriction, pressure to eat, dietary self-efficacy, and food insecurity - are shared. The results of regression analyses assessing dietary self-efficacy as a mediator are then shared for cases in which it was determined that there was a significant association between the predictor and outcomes (1) controlling food parenting practices and fruit consumption, (2) controlling food parenting practices and vegetable consumption, (3) restriction and fruit consumption, and (4) restriction and vegetable consumption. Finally, the results of moderated mediation analyses are shared in which food insecurity is assessed as a moderator of the indirect effects of self-efficacy in each of those models.

Descriptive Statistics

Descriptive statistics, including mean and standard deviations were computed for all variables of interest and presented in Table 2.

Table 2: *Descriptive Statistics for Variables of Interest*

Variable	*M*	SD
Restriction	2.00	0.93
Pressure to eat	3.14	1.11
Controlling Food Parenting Practices	2.41	0.80
Dietary Self-Efficacy	3.53	0.99
Food Insecurity	1.85	1.17
Fruit Consumption	2.29	1.03
Vegetable Consumption	2.62	1.17

Research Question 1: To what extent are controlling food parenting practices (restriction and pressure to eat) during childhood associated with fruit and vegetable consumption among college students?

To assess research question 1, the strength, direction, and statistical significance of these associations was identified using Pearson's correlation coefficient which is a standard measure to assess the association between two continuous variables which range in value from −1 to 1 (Field, 2013). Bivariate Pearson correlations were computed for all continuous variables, in order to examine whether or not linear relationships existed (see Table 4). Controlling food parenting practices (composite score for pressure to eat and restriction) was significantly inversely correlated with fruit consumption ($r = -0.14$, $p = .017$) and vegetable consumption ($r = -0.15$, $p = .015$). Restriction was significantly inversely correlated with vegetable consumption ($r = -0.15$, $p = .016$) but not significantly correlated with fruit consumption. Pressure to eat was significantly correlated with fruit consumption ($r = -0.13$, $p = .026$), but was not significantly correlated with vegetable consumption.

Dietary self-efficacy was found to be significantly positively correlated with fruit consumption ($r = 0.45$, $p < .001$) and vegetable consumption ($r = 0.58$, $p = .001$). Restriction was significantly inversely correlated with dietary self-efficacy ($r = -0.22$, $p = .001$) and no significant association was found between pressure to eat and dietary self-efficacy. Controlling food parenting practices was significantly inversely correlated with dietary self-efficacy ($r = -0.22$, $p = .001$). Food insecurity was found to be significantly inversely correlated with fruit consumption ($r = -0.25$, $p = .001$) and vegetable consumption ($r = -0.31$, $p = .001$). Food insecurity was significantly positively correlated with restriction ($r = 0.36$, $p = .001$) and controlling food parenting practices ($r = 0.32$, $p = .001$) and no significant association was found with pressure to eat. Food insecurity was significantly inversely associated with dietary self-

efficacy (r = −0.41, p = .001), which indicates relative independence between the focal predictor (dietary self-efficacy) and moderator which allows for subsequent moderation analysis.

Table 4: *Correlations Between Variables of Interest*

	FRU	VEG	RES	PTE	FPP	DSE	FOI
1. FRU	1						
2. VEG	**.59****	1					
3. RES	−.10	**−.15****	1				
4. PTE	**−.13***	−.08	**.26****	1			
5. FPP	**−.14***	**−.15****	**.87****	**.70****	1		
6. DSE	**.45****	**.58****	**−.22****	−.11	**−.22****	1	
7. FOI	**−.25****	**-.31****	**.36****	.12	**.32****	**−.41****	1

Table 4: Bolded typeface indicates significance to * p < .05; ** p < .01 level.
Fruit Consumption (FRU) 2. Vegetable Consumption (VEG) 3. Restriction (RES); 4. Pressure to Eat (PTE); 5. Food Parenting Practices (FPP) 6. Dietary Self-Efficacy (DSE); 7. Food Insecurity (FOI)

Mediation Analyses

To address research question 2, four mediation analyses were conducted to investigate the role of dietary self-efficacy as a mediator in the associations between predictor variables (controlling food parenting practices and restriction) on outcome variables (fruit consumption and vegetable consumption).

Baron and Kenny's classic mediation framework (1986) required a significant direct effect between the independent variable and the dependent variable to consider mediation. Contemporary researchers, like Hayes (2009), however, argue that an independent variable can still affect the dependent variable through a mediator without a significant direct independent variable - dependent variable effect, allowing for the possibility of significant indirect effects even when the direct association is not significant. This modern approach facilitates a more

comprehensive exploration of the complex mechanisms that may influence relationships among variables in psychological and social science research. Therefore, mediation analyses were run to assess the potential mediating effect of dietary self-efficacy between restriction and fruit consumption, despite there not being a significant direct correlation between these restriction and fruit consumption.

Research Question 2: Does dietary self-efficacy mediate the associations between controlling food parenting practices, and the subdomains of pressure to eat and restriction, and fruit and vegetable consumption among college students?

Hypothesis 2a: Dietary self-efficacy will mediate the association between controlling food parenting practices in childhood and fruit consumption among college students. It is expected that controlling food parenting practices will be negatively associated with dietary self-efficacy, which will be positively associated with fruit consumption.

An ordinary least squares regression analysis was conducted to investigate the role of dietary self-efficacy as a mediator in the relationship between controlling food parenting practices and fruit consumption. A bootstrap confidence interval for the indirect effect (b = −0.13) based on 5,000 bootstrap resamples which do not contain zero (−0.209, −0.051), suggests that dietary self-efficacy mediates the association between controlling food parenting practices and fruit consumption. The effect of controlling food parenting practices on fruit consumption prior to including the mediator (c path) was significant (b = −0.20, p = .010). However, the direct effect of controlling food parenting practices on fruit consumption was not significant when dietary self-efficacy was included as a mediator (p = .291). Additionally, both the a-path, representing the effect of controlling food parenting practices on dietary self-efficacy (b = −0.28, p = .000), and the b-path, representing the effect of dietary self-efficacy on fruit consumption (b

= 0.45, $p < .001$), were significant. This supports full mediation by dietary self-efficacy, as the direct effect of controlling food parenting practices on fruit consumption becomes non-significant when the mediator is included.

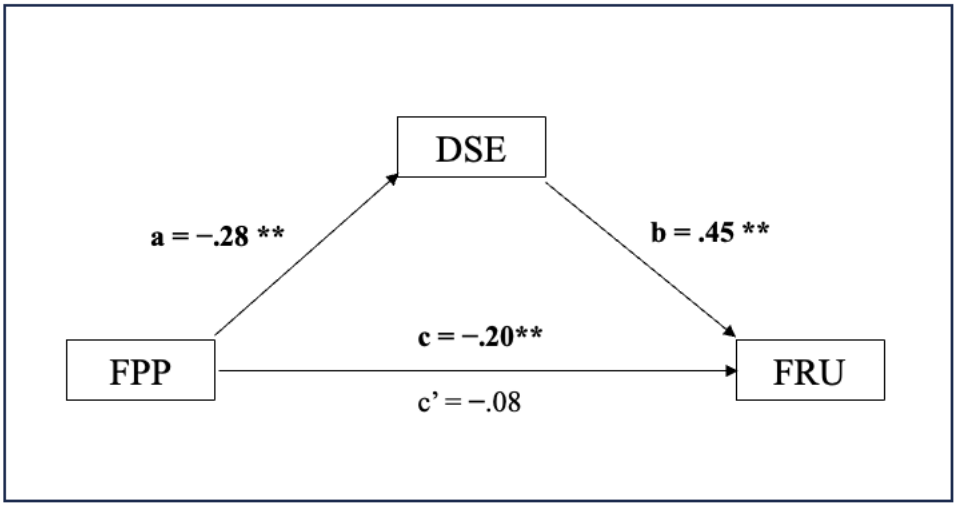

Figure 2: Path diagram for food parenting practices on fruit consumption through the pathway of dietary self-efficacy.
*p < .05, **p < .01

Hypothesis 2b: Dietary self-efficacy will mediate the association between food parenting practices in childhood and vegetable consumption among college students. It is expected that controlling food parenting practices will be negatively associated with dietary self-efficacy, which will be positively associated with vegetable consumption.

An ordinary least squares regression analysis was conducted to investigate the role of dietary self-efficacy as a mediator in the relationship between controlling food parenting practices and vegetable consumption. A bootstrap confidence interval for the indirect effect (b = −0.19) based on 5,000 bootstrap resamples which do not contain zero (−0.303, −0.080), suggests that dietary self-efficacy mediates the association between controlling food parenting practices and vegetable consumption. The effect of controlling food parenting practices on vegetable consumption prior to including the mediator (c path) was significant ($b = −0.21$, p = .018).

However, the direct effect of controlling food parenting practices on vegetable consumption was not significant when dietary self-efficacy was included as a mediator (p = .722). Additionally, both the a-path, representing the effect of controlling food parenting practices on dietary self-efficacy (*b* = −0.28, *p* = .000), and the b-path, representing the effect of dietary self-efficacy on vegetable consumption (*b* = 0.66, *p* = .000), were significant. This supports full mediation by dietary self-efficacy, as the direct effect of controlling food parenting practices on vegetable consumption becomes non-significant when the mediator is included.

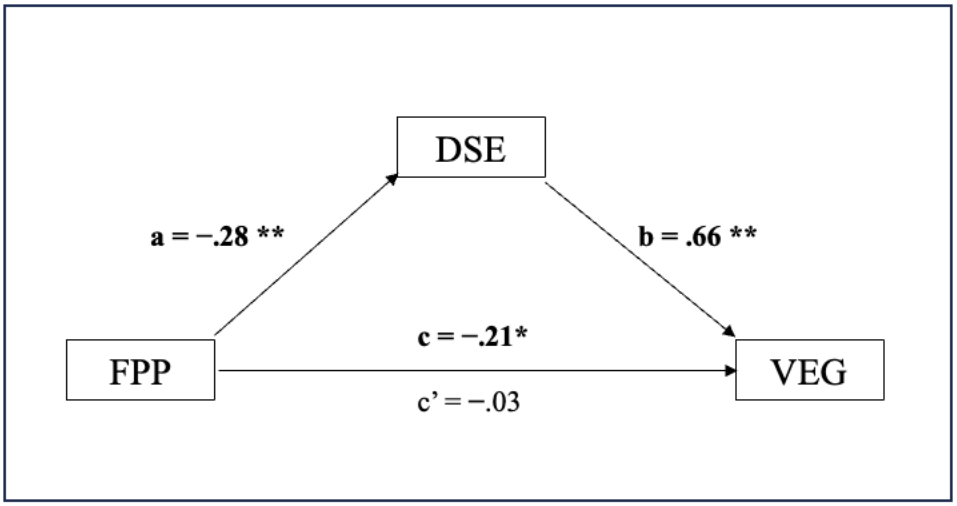

Figure 3: Path diagram for food parenting practices on vegetable consumption through the pathway of dietary self-efficacy.
*p < .05, **p < .01

Hypothesis 2c: Dietary self-efficacy will mediate the association between restriction in childhood and fruit consumption among college students. It is expected that restriction will be negatively associated with dietary self-efficacy, which will be positively associated with fruit consumption.

An additional ordinary least squares regression analysis was conducted to investigate the role of dietary self-efficacy as a mediator in the relationship between restriction and fruit consumption. A bootstrap confidence interval for the indirect effect (b = −0.10) based on 5,000

bootstrap resamples which do not contain zero (−0.174, −0.044), suggests that dietary self-efficacy mediates the association between restriction and fruit consumption. The effect of restriction on fruit consumption prior to including the mediator (c path) was not significant (p = .073). The a-path, representing the effect of restriction on dietary self-efficacy ($b = -0.22$, $p = .001$), and the b-path, representing the effect of dietary self-efficacy on fruit consumption ($b = 0.46$, $p = .000$), were significant. This supports full mediation by dietary self-efficacy, as the direct effect of controlling food parenting practices on vegetable consumption becomes non-significant when the mediator is included. These results suggest that without accounting for dietary self-efficacy, controlling food parenting practices did not have a significant effect on fruit consumption. According to Hayes (2009), an independent variable can still affect the dependent variable through a mediator without a significant direct independent-dependent effect, allowing for the possibility of significant indirect effects even when the direct association is not significant.

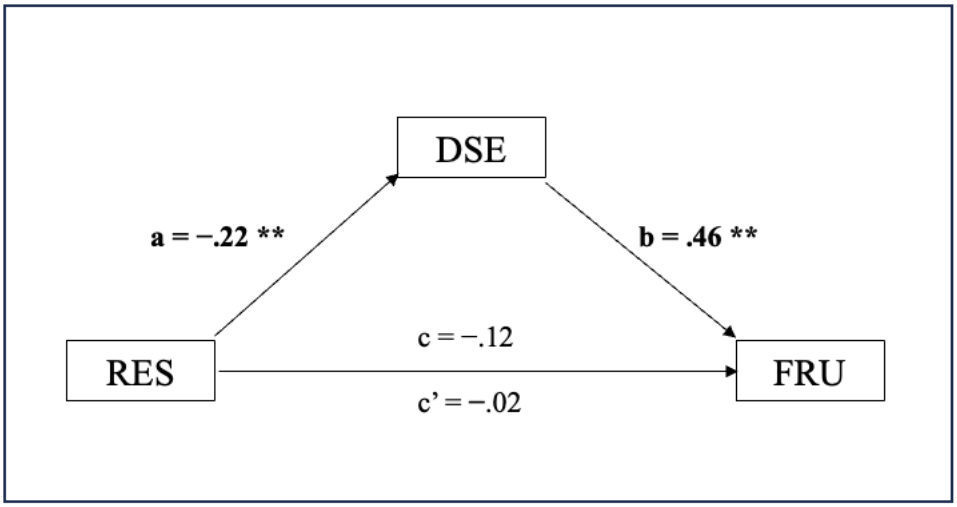

Figure 4: Path diagram for restriction on fruit consumption through the pathway of dietary self-efficacy.
*p < .05, **p < .01

Hypothesis 2d: Dietary self-efficacy mediates the association between restriction in childhood and vegetable consumption among college students. It is expected that restriction will be negatively associated with dietary self-efficacy, which will be positively associated with vegetable consumption.

A final ordinary least squares regression analysis was conducted to examine the role of dietary self-efficacy as a mediator in the relationship between restriction and vegetable consumption. A bootstrap confidence interval for the indirect effect (b = −0.15) based on 5,000 bootstrap resamples which do not contain zero (−0.239, −0.065), suggests that dietary self-efficacy mediates the association between restriction and vegetable consumption. The effect of restriction on vegetable consumption prior to including the mediator (c path) was significant (*b* = −0.17, p = .023). However, the direct effect of restriction on vegetable consumption was not significant when dietary self-efficacy was included as a mediator (p = .683). Additionally, both the a-path, representing the effect of restriction on dietary self-efficacy (*b* = −0.22, *p* = .001), and the b-path, representing the effect of dietary self-efficacy on vegetable consumption (*b* = 0.66, *p* = .000), were significant. This supports full mediation by dietary self-efficacy, as the direct effect of restriction on vegetable consumption becomes non-significant when the mediator is included.

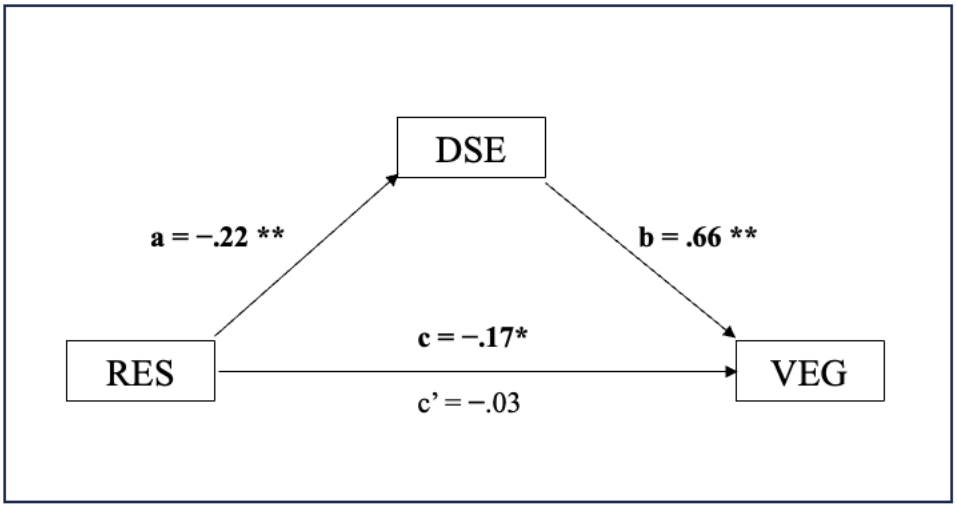

Figure 5: Path diagram for restriction on vegetable consumption through the pathway of dietary self-efficacy.
*p < .05, **p < .01

Note: Mediation analyses were not run to for hypothesis 2e nor hypothesis 2f, as initial correlations were not found in the pressure to eat and fruit intake, nor pressure to eat and vegetable intake, nor pressure to eat and dietary self-efficacy.

Moderated Mediation Analyses

The hypothesized moderated mediation models were tested using the PROCESS macro model number 14, which tests a model in which food insecurity moderates the b-path of the above mediation models (see Figure 1). Mediation was found in all four models, and therefore moderated mediation analyses were run for all four models, testing (1) IV: controlling food parenting practices on DV: fruit consumption, (2) IV: controlling food parenting practices on DV: vegetable consumption, (3) IV: restriction on DV: fruit consumption, and (4) IV: restriction on DV: vegetable consumption.

Research Question 3: How does food insecurity moderate the indirect effect of dietary self-efficacy on fruit and vegetable consumption among college students?

Hypothesis 3a: In a model examining food parenting practices and fruit consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on fruit consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

The analysis of the hypothesized moderated mediation model 3a, explored the impact of controlling food parenting practices on fruit consumption, mediated by dietary self-efficacy and moderated by food insecurity. The path from controlling food parenting practices to dietary self-efficacy was significant, indicating that controlling food parenting practices negatively predict dietary self-efficacy (a-path = −0.28, p = .000). Furthermore, the analysis revealed a significant b-path from dietary self-efficacy to fruit consumption (b-path = 0.53, p = .000). This association was not found to be moderated by food insecurity (*p* = .193). The direct effect of controlling food parenting practices on fruit consumption (c'-path) was not significant (*p* = .449). The index of moderated mediation was also not found to be significant, with bootstrapped 95% confidence intervals including zero (−0.008, 0.053).

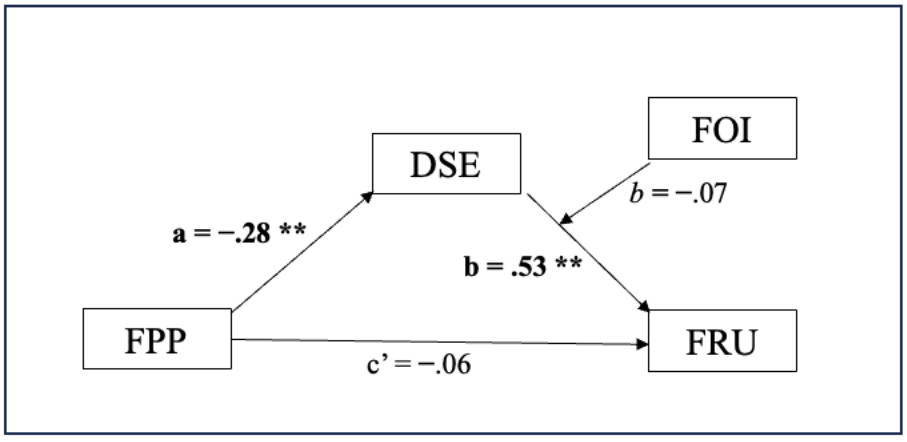

Figure 6: Path diagram for food parenting practices on fruit consumption through the pathway of dietary self-efficacy, with food insecurity moderating the b-path.
*p < .05, **p < .01

Hypothesis 3b: In a model examining food parenting practices and vegetable consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

The analysis of the hypothesized moderated mediation model 3b, explored the impact of controlling food parenting practices on vegetable consumption, mediated by dietary self-efficacy and moderated by food insecurity. The path from controlling food parenting practices to dietary self-efficacy was significant, indicating that controlling food parenting practices negatively predict dietary self-efficacy (a-path = −0.28, p = .000). Furthermore, the analysis revealed a significant b-path from dietary self-efficacy to vegetable consumption (b-path = 0.76, p = .000), and the direct effect of controlling food parenting practices on vegetable consumption was not significant when dietary self-efficacy was included as a mediator (p = .999). This association was not moderated by food insecurity (*p* = .022).

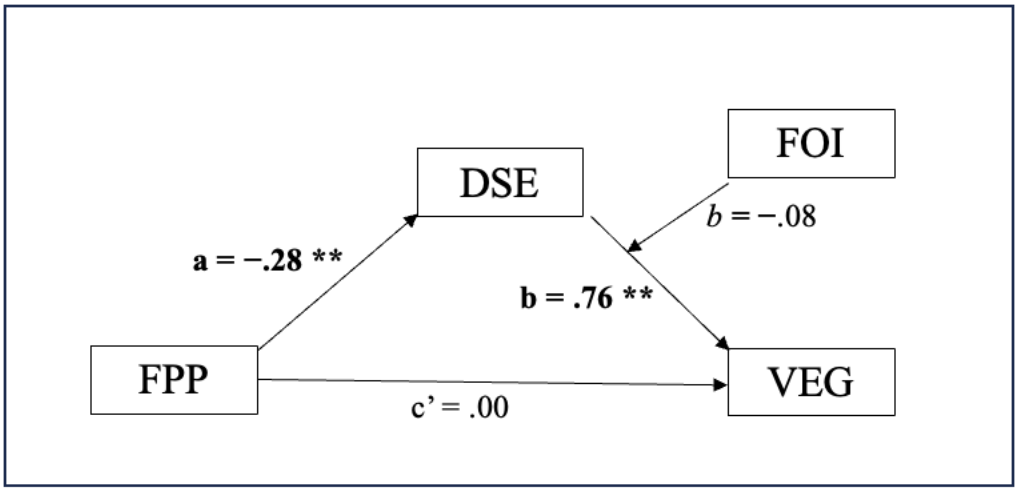

Figure 7: Path diagram for food parenting practices on vegetable consumption through the pathway of dietary self-efficacy, with food insecurity moderating the b-path.
*p < .05, **p < .01

Hypothesis 3c: In a model examining restriction and fruit consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on fruit consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

The results of the moderated mediation analysis for hypothesis 3c, were conducted to assess the impact of parental restriction on fruit consumption, with dietary self-efficacy serving as the mediator and food insecurity as the moderator. The a-path from restriction to dietary self-efficacy was significant, indicating that greater parental restriction is associated with lower dietary self-efficacy ($b = -0.22$, $p = .001$). In the b-path analysis, dietary self-efficacy was found to significantly predict fruit consumption ($b = 0.53$, p = .000). However, this effect was not moderated by food insecurity (p = .220). The direct effect of restriction on fruit consumption (c'-path) was not significant ($p = .906$). The index of moderated mediation was also not found to be significant, with bootstrapped 95% confidence intervals including zero, ranging from [−0.007, 0.041].

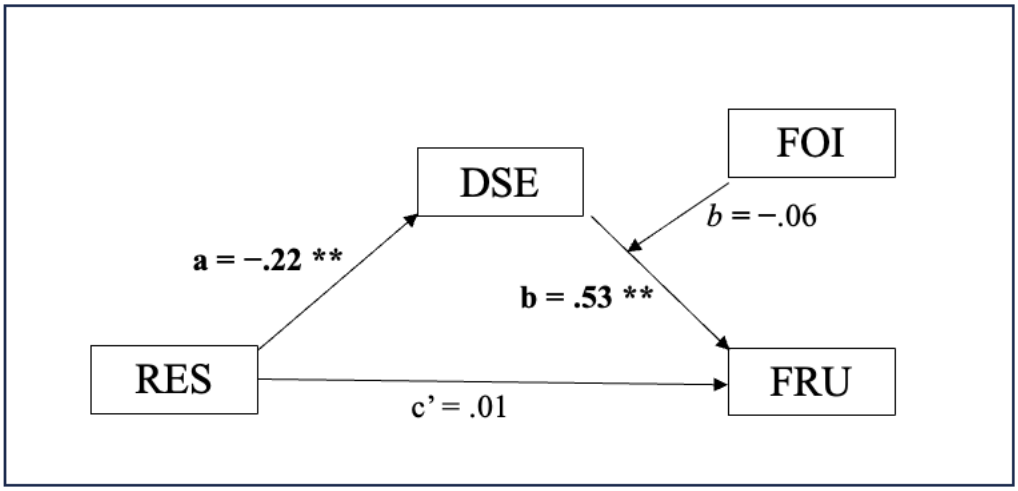

Figure 8: Path diagram for restriction on fruit consumption through the pathway of dietary self-efficacy, with food insecurity moderating the b-path.
*p < .05, **p < .01

Hypothesis 3d: In a model examining restriction and vegetable consumption, food insecurity will moderate the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.

The results of the moderated mediation analysis for hypothesis 3d, were conducted to assess the impact of parental restriction on vegetable consumption, with dietary self-efficacy serving as the mediator and food insecurity as the moderator. The a-path from restriction to dietary self-efficacy was significant, indicating that greater parental restriction is associated with lower dietary self-efficacy ($b = -0.22$, $p = .001$). In the b-path analysis, dietary self-efficacy was found to significantly predict vegetable consumption ($b = 0.76$, $p = .000$). However, this effect was not moderated by food insecurity ($p = .139$). The direct effect of restriction on fruit consumption (c'-path) was not significant ($p = .972$). The index of moderated mediation was also not found to be significant, with bootstrapped 95% confidence intervals including zero (−0.002, 0.045).

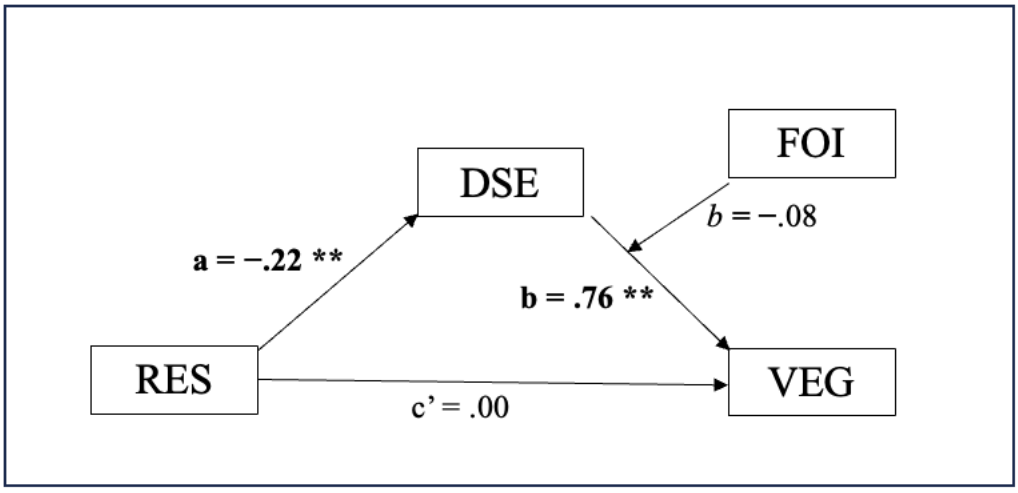

Figure 9: Path diagram for restriction on vegetable consumption through the pathway of dietary self-efficacy, with food insecurity moderating the b-path.
*p < .05, **p < .01

Note: Moderated mediation analyses were not run to for hypothesis 3e nor hypothesis 3f which assessed pressure to eat, as initial correlations were not found in the pressure to eat and fruit intake, nor pressure to eat and vegetable intake, nor pressure to eat and dietary self-efficacy.

Table 5: Research Questions and Hypotheses

Research Question	Hypotheses	
RQ 1: To what extent are controlling food parenting practices (restriction and pressure to eat) during childhood associated with fruit and vegetable consumption among college students?	**1a:** Controlling food parenting practices in childhood were associated with fruit consumption among college students.	Supported
	1b: Controlling food parenting practices in childhood were associated with vegetable consumption among college students.	Supported
	1c: Parental restriction in childhood is not associated with fruit consumption among college students.	Not supported
	1d: Parental restriction in childhood were associated with vegetable consumption among college students.	Supported
	1e: Parental pressure to eat in childhood is not associated with higher fruit consumption among college students.	Not supported
	1f: Parental pressure to eat in childhood is not associated with higher vegetable consumption among college students.	Not supported
RQ 2: Does dietary self-efficacy mediate the association between controlling food parenting practices and fruit and vegetable consumption among college students?	**2a:** Dietary self-efficacy mediates the association between controlling food parenting practices in childhood and fruit consumption among college students.	Supported
	2b: Dietary self-efficacy mediates the association between controlling food parenting practices in childhood and vegetable consumption among college students.	Supported
	2c: Dietary self-efficacy mediates the association between restriction in childhood and fruit consumption among college students.	Supported

	2d: Dietary self-efficacy mediates the association between restriction in childhood and vegetable consumption among college students.	Supported
RQ 3: How does food insecurity moderate the indirect effect of dietary self-efficacy on fruit and vegetable consumption among college students?	**3a:** In a model examining controlling food parenting practices and fruit consumption, food insecurity does not moderate the mediation effect of dietary self-efficacy on fruit consumption, as the indirect effect is consistent regardless of the level of food insecurity.	Not supported
	3b: In a model examining controlling food parenting practices and vegetable consumption, food insecurity moderates the mediation effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.	Not supported
	3c: In a model examining restriction and fruit consumption, food insecurity does not moderates the mediating effect of dietary self-efficacy on fruit consumption, as the indirect effect is consistent regardless of the level of food insecurity.	Not supported
	3d: In a model examining restriction and vegetable consumption, food insecurity moderates the mediating effect of dietary self-efficacy on vegetable consumption, with the indirect effect being weaker among college students who experience higher levels of food insecurity.	Not supported

Summary of Key Findings

The present study's findings offer a nuanced understanding of the factors influencing fruit and vegetable consumption among college students. The research examined the mediating role of dietary self-efficacy in the relationship between controlling food parenting practices, including parental restriction, and dietary outcomes, with a consideration of food insecurity as a potential moderator. Contrary to initial hypotheses, pressure to eat did not emerge as a significant predictor of fruit or vegetable consumption, nor was it associated with dietary self-efficacy. Consequently, pressure to eat was excluded from subsequent analyses.

In contrast and in support of a priori hypotheses, both controlling food parenting practices and parental restriction were significantly related to vegetable consumption and controlling food parenting practices were significantly related to fruit consumption. Specifically, dietary self-efficacy was found to mediate the relationship between controlling food parenting practices, and restriction specifically, and both fruit and vegetable consumption. The direct effects of controlling food parenting practices and parental restriction on fruit consumption were not significant when dietary self-efficacy was included as a mediator. This underscores the pivotal role of dietary self-efficacy in influencing eating behaviors. However, before accounting for the mediator, both controlling food parenting practices and parental restriction exhibited significant total effects on vegetable consumption, indicating that these factors also exert direct influences on dietary behaviors. Contrary to a priori hypotheses, food insecurity was not found to moderate the relationship between dietary self-efficacy and fruit consumption in any of the models, suggesting that the influence of dietary self-efficacy on fruit consumption is stable across different levels of food security.

CHAPTER 6: DISCUSSION

The dietary patterns of college students have garnered considerable attention due to persistent findings indicating suboptimal fruit and vegetable intake within this demographic (Pelletier & Laska, 2013; Samples, 2017). While taste preferences, availability, and convenience have been identified as barriers to consumption (Alkazemi, 2021; Brug et al., 2008), the determinants of dietary behaviors in this group are multifaceted. Ecological systems theory posits that multiple, interacting layers of influence shape behaviors, and this perspective aligns with the observed complexity in college students' dietary habits. Parental influence, for instance, has been recognized as a formative factor in the development of eating behaviors that persist into later life (Shloim et al., 2015; Yee et al., 2017). Within this context, dietary self-efficacy has emerged as a pivotal construct, influencing eating behaviors and serving as a potential target for interventions (Fitzgerald et al., 2013; Kok et al., 2015). The prevalence of food insecurity among college students, which is disproportionately high, adds another layer of complexity and necessitates examination through the lens of social cognitive theory (Bruening et al., 2017).

In response to these considerations, the current study sought to examine the interplay among controlling food parenting practices, dietary self-efficacy, food insecurity, and fruit and vegetable consumption in a college student population. Drawing on Bronfenbrenner's ecological systems theory and Bandura's social cognitive theory, the study was designed to test the hypotheses that childhood controlling food parenting practices as whole, specifically restriction and pressure to eat, would correlate with current fruit and vegetable consumption, mediated by dietary self-efficacy and potentially moderated by food insecurity for college students.

The study's findings contribute novel insights into the role of controlling food parenting practices in shaping dietary behaviors. Controlling food parenting practices, and restriction

specifically, were found to be associated with vegetable consumption. However, contrary to a priori hypotheses, pressure to eat did not emerge as a significant predictor of fruit or vegetable consumption, nor was it related to dietary self-efficacy, suggesting that it may not be a critical factor in this population's dietary choices.

In support of a priori hypotheses, mediation analyses revealed that dietary self-efficacy is a significant mediator in the association between both controlling food parenting practices and the subdomain of parental restriction, and fruit consumption and vegetable consumption. Notably, food insecurity did not significantly moderate the indirect effects of dietary self-efficacy on fruit consumption nor vegetable consumption for any of the predictor variables, indicating that the influence of dietary self-efficacy is consistent across varying levels of food security, which does not support a priori hypotheses. These findings underscore the importance of ecological and social cognitive approaches in which both individual and contextual factors are considered when examining fruit and vegetable consumption among college students. These findings will be discussed in detail throughout the remainder of this chapter.

Controlling Food Parenting Practices and Fruit and Vegetable Consumption

Collectively, controlling food parenting practices, which encompass both pressure to eat and restriction, were significantly negatively correlated with fruit and vegetable consumption in the current study, which aligns with existing literature indicating that controlling food parenting practices can predict eating behaviors both concurrently and later in life (Birch & Deysher, 1986; Faith et al., 2004; Harakeh et al., 2004; Mikkilä et al., 2004). It was surprising, therefore, to find that controlling food parenting practices together were associated with both fruit and vegetable consumption, though different results were found for the subdomains. Restriction was only

correlated with vegetable consumption and pressure to eat was only associated with fruit consumption, which will be explored in depth in the following section.

Controlling practices, such as restriction and pressure to eat, may lead to a reliance on external cues over time, weakening children's responsiveness to internal cues like hunger and satiety. This, in turn, may affect their self-efficacy in making healthy dietary choices and decreases their preference for the controlled foods. For instance, Blissett (2011) and Pearson and colleagues (2009) have documented the adverse effects of controlling food parenting practices on children's dietary preferences and self-regulation.

One reason for the differing results between controlling food parenting practices as a composite construct and its subdomains may be that the construct of controlling food parenting practices may be indicative of general controlling practices which were coercive and therefore did not support the development of healthy eating behaviors (Vaughn et al., 2016). Coercive controlling practices may lead to a feeling of lack of control and do not support the development of autonomy (Vaughn et al., 2016). If parents were engaging in both pressure to eat and restriction, especially if the rationale was not made clear to the child, it could have been deleterious to the development of dietary self-efficacy. According to social cognitive theory, not knowing the rationale behind tasks or actions can negatively impact an individual's self-efficacy and their ability to complete tasks effectively. Therefore, if expectations around food are unclear and/or inconsistent – such as a mix of restriction and pressure to eat without accompanying rationale from parents – it may hinder the development of dietary self-efficacy and subsequently, consumption of healthy foods.

Restriction alone only was significantly associated with lower rates of vegetable consumption but not fruit. This may be because once individuals have more autonomy over their

eating, those who experience restriction, are more likely to seek out previously restricted foods (Fisher & Birch, 1999; Jansen et al., 2007; Rollins et al., 2015). While these studies are largely conducted with samples of children, it is plausible that these effects occur long-term as well, as several studies link parental restriction in childhood to eating behaviors later in life (Birch et al., 2007). However, additional longitudinal research into the specific effects of restriction on seeking out restricted food over several different time periods is warranted.

In the college environment, students may seek out previously restricted foods they now have access to, minimizing their efforts to eat vegetables when faced with these other more appealing/palatable options. Vegetables are not considered palatable or liked by college students at the same rate as fruit (Henley et al., 2023). Fruit consumption was not associated with restriction and that may be because fruit is generally considered more palatable and therefore is a desired food for many students (Brug et al., 2008; Trudeau et al., 1998; Ramsay et al., 2015; Wardle & Cooke, 1999), even for those students who experienced high levels of restriction in childhood. These findings support the notion that generally controlling, and specifically restrictive, controlling food parenting practices in childhood may inadvertently lead to decreased intake of nutrient rich foods among emerging adults, in alignment with the existing body of research.

Surprisingly, no significant correlation was found between pressure to eat and dietary self-efficacy. This finding diverges from the hypotheses which were based on existing literature, which often links controlling food parenting practices, such as restriction, with self-efficacy in dietary choices and subsequent food consumption. The lack of a correlation between pressure to eat and vegetable consumption is inconsistent with literature which suggests that pressure to eat is associated with an aversion to targeted foods later in life (Ellis et al., 2016). Pressure to eat

was, however, negatively associated with fruit consumption, indicating that the more pressure to eat that an individual experienced in childhood, the less likely they are to consume fruit as a college student.

Food Parenting Practices Effect Sizes

The effects of controlling food parenting practices and restriction on fruit and vegetable consumption are significant, though unsurprisingly small, considering the ecological systems theory which highlights the range of dynamic social and environmental factors, as well as genetics, that are all critical in affecting children's eating behaviors (Bandura, 1998; Scaglioni et al., 2011). On an individual level, issues of taste and preference play a large role in the context of eating behaviors (Nicklaus, et al., 2019). However, the microsystem, which includes immediate social influences such as peers, is also highly linked to the development of eating behaviors over time. For example, studies have found that peer influences are strongly associated with college students' food choices and consumption patterns, along with a range of other factors across the ecological spectrum such as parental food behavior, access to food, and food knowledge (Sogari et al., 2018).

It is critical for parents to recognize the benefits that these various different influences provide and use them to their advantage. Parents should strive to be less restrictive and less controlling of eating behavior in the home, recognizing that varied experiences throughout the dynamic ecosystem in which their child engages with food are highly influential. For example, several studies have found that children actually eat more varied diets and non-preferred foods in a school setting (cite), potentially due to the lack of options and lack of parental influence over their eating behavior in that specific instance, where they have a more controlled food environment but less controlling behaviors by authority figures over their specific eating. By

acknowledging the multifaceted nature of children's eating behaviors and the limitations of parental control, parents can adopt a more balanced and effective approach to promoting healthy eating habits. This may involve providing a variety of food options, exposing children to new foods, and creating opportunities for them to make independent choices, while still guiding and supporting their dietary decisions.

Mediating Effects of Dietary Self-Efficacy

Controlling food parenting practices, including restriction and pressure to eat, were posited to have enduring effects on the eating behaviors of college students in the current study, a phenomenon that has been substantiated by empirical studies (Clark et al., 2007; Puhl et al., 2022; Wardle et al., 2005). These early experiences with food are internalized and can influence dietary self-efficacy, which in turn, shapes dietary behaviors during the critical transition to adulthood. In the current study, dietary self-efficacy was found to be highly correlated with both fruit and vegetable consumption, which reflects an abundance of literature. Dietary self-efficacy was hypothesized as a mediating variable in the relationship between controlling food parenting practices and the intake of fruits and vegetables among college students. The findings in the current study revealed that dietary self-efficacy was a significant mediator in all tested models, including controlling food parenting practices on fruit consumption, controlling food parenting practices on vegetable consumption, restriction on fruit consumption, and restriction on vegetable consumption.

These results highlight the central role of dietary self-efficacy as a mediator in the relationship between both food parenting practices and the subdomain of parental restriction, with vegetable consumption. In both cases, dietary self-efficacy fully mediated the relationship, meaning that the effect of controlling food parenting practices and restriction on vegetable

consumption is primarily through their impact on children's confidence in their ability to make healthy dietary choices. These findings are supported by extant literature which has found dietary self-efficacy to be identified as a potential mediator between parenting practices and eating behaviors in both childhood (Ievers-Landis et al., 2003; Xu et al., 2020; Young et al., 2004) and emerging adulthood (Kok et al., 2015). However, the mediation effects are not always consistent across studies (Bouwman et al., 2020). Some find full mediation by self-efficacy while others find no mediation, suggesting self-efficacy is a complex construct sensitive to the specific measurements and there are confounding variables. Given the complexity of self-efficacy and its varied operationalization across different studies, it is understandable that the literature presents mixed findings. The diverse ways in which self-efficacy is measured and operationalized contribute to the variability in findings related to its impact on behaviors, including dietary behaviors. Specifically, measures of general self-efficacy are often used in studies of dietary behavior, despite Bandura's specific recommendation to utilize more task and domain specific measures of self-efficacy.

It is important to note that the direct effects of controlling food parenting practices and restriction on vegetable consumption became non-significant when dietary self-efficacy is considered. This is consistent with existing research which emphasize a strong effect of dietary self-efficacy on fruit and vegetable consumption, over and above other factors, which is demonstrated in a multitude of studies which have found child self-efficacy to predict fruit and vegetable consumption over and above other cognitive constructs, and similar results have been found in adult populations. This suggests that while dietary self-efficacy is a key factor, there are also direct effects of these parenting practices on vegetable consumption that operate independently of dietary self-efficacy. This supports an abundance of existing literature linking

controlling food parenting practices earlier in childhood to dietary behaviors in emerging adulthood, such as (Harakeh et al., 2004; Mikkilä et al., 2004; Mitchell et al., 2013).

In the current study, dietary self-efficacy was also found to significantly mediate the impact of controlling food parenting practices of fruit consumption, again underscoring the critical influence dietary self-efficacy on dietary behaviors. Parallel to the influence of controlling food parenting practices, dietary self-efficacy also significantly mediated the association between parental restriction and fruit consumption. The absence of a direct effect of restriction on fruit consumption, when accounting for dietary self-efficacy, further supports the mediation model. This indicates that the pathway from restriction to dietary self-efficacy and from dietary self-efficacy to fruit consumption is crucial. It reinforces the idea that dietary self-efficacy serves as a critical intermediary in these relationships, highlighting the substantial mediating effect of dietary self-efficacy in the associations between both controlling food parenting practices and parental restriction with fruit consumption. These findings support the existing body of literature which indicates that self-efficacy is a critical mediating factor between controlling food parenting practices throughout childhood and adolescence and fruit and vegetable consumption later in life (Ma & Hample, 2018; Shermadou, 2018).

Efforts by parents to rigorously control their child's dietary intake can have adverse effects, leading to reduced satiety responsiveness and diminished self-efficacy in making healthier food choices, consistent with findings from Fisher & Birch (2008) and Savage et al. (2007). Research indicates that high levels of parental control over children's eating can be counterproductive, impairing children's ability to regulate their energy intake effectively (Rollins et al., 2015). Restrictive feeding practices may inadvertently undermine dietary self-efficacy over time, distorting children's self-perception regarding their capacity to manage their food intake.

The absence of opportunities for decision-making can negatively impact children's confidence in choosing healthy foods, which may hinder the development of the necessary skills for making informed dietary decisions (Hubbs-Tait et al., 2008) which can become a reciprocal issue with a lack of confidence in making healthy choices leading to poor choices which leads back to a lack of confidence in one's ability to do so. This dynamic can adversely affect dietary self-efficacy over time, as children may come to believe that external factors, rather than their own choices, dictate their eating habits and then make less of an intentional effort to consume vegetables, particularly when it is not easy or easily palatable to do so.

Additionally, this type of restrictive control may prompt children to pursue perfection, attempting to fulfill all parental expectations (Spiers Neumeister, 2004). However, this pursuit of perfection, coupled with a lack of confidence in making informed food choices (indicative of low perceived behavioral control), may result in various unhealthy eating patterns (Hubbs-Tait et al., 2008). When children lack the ability to regulate their intake and independently recognize their food cues, especially when combined with a preference for previously restricted foods (Savage et al., 2007), it is logical that upon entering a new environment with abundant choices and without the same level of parental control, such as college, students with a background of restrictive food parenting would be less inclined to seek out more nutritious options like vegetables and more inclined to seek out less nutritious food options.

Therefore, this significant negative correlation between controlling food parenting practices and parental restriction with dietary self-efficacy, indicates that increased restriction and controlling practices collectively may undermine a child's confidence in their ability to consume fruits and vegetables. This reflects literature indicating that restrictive and controlling feeding practices negatively impact because they limit opportunities to learn and develop

confidence in making healthy choices, thereby significantly influencing children's dietary behaviors and self-efficacy through the lens of social cognitive theory. Furthermore, the current study found a significant negative correlation between both controlling food parenting practices and parental restriction with dietary self-efficacy. This indicates that overall controlling practices together may undermine a child's confidence in their ability to consume fruits and vegetables. Potentially, by being both restrictive at times and pressuring to eat at other times, it leads to even more confusion about what to eat and how to know what one's body needs, which could lead to lower dietary self-efficacy. The issue appears to be this overall controlling behavior by parents, which encompasses both restriction and pressure to eat. These findings suggest that the way children learn about eating and their own role and abilities related to food choices is significantly influenced by controlling food parenting practices, which can have lasting effects on their dietary behaviors and self-efficacy.

Davison and Birch (2001) explain how parenting styles contribute to the shaping of the development of child eating behaviors. Several studies have linked these controlling food parenting practices of restriction and pressure to eat to parenting style. Parenting styles distinctly capture the constructs of demandingness, and responsiveness (Baumrind, 1971) and have been widely established to be linked to both self-efficacy (e.g., Tam et al., 2013) and eating behaviors (e.g., Lopez et al., 2018) among children and adolescents. Authoritative parents (high responsiveness, high demand) are caring and have specific expectations for their child, providing warmth and support to encourage positive behavior (Berge et al., 2010). Authoritarian parents (low responsiveness, high demand) are strict and less affectionate, often using verbal or physical warnings (Berge et al., 2010). This parenting style has been associated with more healthful dietary intake in children, including increased fruit, vegetable, and dairy consumption (Loncar et

al., 2023). Authoritative parents may foster children's dietary self-efficacy by providing an environment that promotes self-regulation and autonomy around eating (Loncar et al., 2023; Savage et al., 2007). In contrast, authoritarian parenting is characterized by high demandingness and low responsiveness. Authoritarian parents exert strict control over their children's eating, often forcing them to eat certain foods and restricting access to others. This controlling feeding style has been linked to poorer self-regulation of eating and increased intake of restricted foods (Lopez et al., 2018; Savage et al., 2007). The lack of autonomy-support in authoritarian parenting may undermine children's development of dietary self-efficacy (Savage et al., 2007). Permissive parents (high responsiveness, low demand) allow their child to make their own decisions with few rules, while neglectful parents (low responsiveness, low demand) lack the necessary care and communication for a positive parent-child relationship (Berge et al., 2010). Permissive feeding practices, such as allowing unrestricted access to unhealthy foods, have been associated with poorer diet quality (Lopez et al., 2018; Savage et al., 2007). The lack of structure and modeling in permissive parenting may hinder children's development of dietary self-efficacy. Authoritative parenting creates an encouraging environment for adolescents to adopt and maintain healthy eating habits. In contrast, authoritarian, permissive, and neglectful parenting styles can hinder a child's ability to self-regulate their food intake (Berge et al., 2010; Kakinami et al., 2015). Parents who do not respond to their child's dietary needs or control their child's intake can prevent them from learning to regulate their own food consumption (Frankel et al., 2012).

Controlled Environment vs. Controlling Practices

Surprisingly, the correlation between pressure to eat and dietary self-efficacy was not significant. This finding diverges from the hypothesized outcome and existing literature that

often links controlling food parenting practices, such as restriction, with self-efficacy in dietary choices and subsequent food consumption. Similarly, the lack of a correlation between pressure to eat and fruit and vegetable consumption is inconsistent with literature that suggests that pressure to eat is associated with an aversion to targeted foods later in life (Fisher et al., 2002; Russell & Worsley, 2013). The absence of an association between pressure to eat and dietary self-efficacy, despite the established connection with restriction, may be attributed to the distinct nature of these subdomains within controlling food parenting practices.

A potential explanation for these findings is that some research indicates that certain types of controlling practices may be beneficial (Ogden et al., 2006) and it is possible that the items in the current survey occur in a controlled food environment while the items in restriction are more representative of deleterious controlling food parenting practices. A controlled food environment is associated with higher intakes of dairy and vegetables, however parental control over a child's eating behavior has the opposite effect. A controlled food environment is one in which a balance of nutrient-rich food is made routinely available, but the decision of which food items to eat and how much is decided by the child (Vaughn et al., 2016). This system aims to provide nutritious, developmentally appropriate food options while allowing room for the child to develop a sense of ownership and autonomy in their health by participating in the decision-making process.

On the other hand, creating strict food rules, dictating when and what to eat, or coercing food intake are ineffective ways to improve eating behaviors in children and young adults, as they contribute to a lack of control or sense of ownership over health for the child. Although parents may employ these controlling techniques with intentions to promote healthy eating habits and prevent weight gain, they may inadvertently yield unintended deleterious outcomes related

to a child's food preferences, self-regulation, and dietary self-efficacy. Therefore, it is possible that the items assessing pressure to eat in the current study, when independent of restriction, are occurring in a controlled eating environment but are not a controlling practice. However, when employed with restriction, then pressure to eat may create confusion regarding expectations around food for the child which can hinder the development of dietary self-efficacy. Examining the mechanisms through which these controlling food parenting practices influence eating behaviors is crucial for understanding the development of dietary habits (Vaughn et al., 2016). The current study's findings highlight the importance of additional research considering the specific types of controlling practices and their independent and combined effects on eating behavior and dietary self-efficacy.

Food Insecurity and Fruit and Vegetable Consumption

Contrary to the a priori hypotheses, the findings of this study indicate that food insecurity did not moderate the mediating pathway between dietary self-efficacy and fruit or vegetable consumption. Over half of the sample population reported some instance of experiencing food insecurity, with nearly 18% of the population reporting a score between 3-5 which is similar to the USDA 2022 percentage of households reporting low food security (12.8%) and very low food security (5.1%) (USDA ERS, 2022). However, college students generally experience food insecurity at a uniquely high rate – approximately 3-4 times higher than the general population (Bruening et al., 2017; Nikolaus et al., 2020). Therefore, it is possible that the sample in the current study does not accurately reflect the larger college student population and additional research is needed. Additional explanation is warranted, however. These results highlight the complex and multidimensional nature of food insecurity, which extends beyond just the availability of food to encompass factors such as access and availability of other options. It is

also critical to consider potential nuance in interpretation of the items and the potential that the sample is not sufficiently representative.

Food insecurity, access, and availability are highly intertwined – especially for college students, many of whom are navigating a new food landscape and level of autonomy. The use of the awareness subscale of food insecurity (Wright, 2022) may not have fully captured the unique experience of food insecurity in this environment. The items in this subscale specifically address "money for" food, but this may not accurately capture the full population experiencing food insecurity on college campuses, as meal plans, free food, and other factors may be more linked to dietary self-efficacy and autonomy (Bruening et al., 2016; Sternman Rule & Jack, 2019).

Food insecurity is linked to irregular meal consumption (Larson et al., 2009) and convenience food eating (Nelson et al., 2008; Sternman Rule & Jack, 2019). It is possible that food insecurity was not a significant moderator in the current study because the habits of college students across the food insecurity spectrum may be confounded with those of food insecurity, therefore obscuring the impact (Bruening et al., 2016; Nikolaus et al., 2019). Approximately 40% of college students report time constraints as a barrier to maintaining healthy eating habits (Larson et al., 2009), and "eating on the go" meals are common (Sternman Rule & Jack, 2019). Students with additional financial responsibilities, extra classes, and other commitments may feel more pressure from these time constraints, which can intersect with the operating hours of dining halls, potentially explaining why students, including those classified as food insecure, frequently do not fully utilize their meal plan meals (Fernandez et al., 2019; Nikolaus et al., 2019; van Woerden et al., 2019). In one study, both food secure and food insecure college students reported difficulty accessing food (Boone et al., 2021), indicating that accessing healthy food consistently is difficult for students across the spectrum of food insecurity.

Irregular mealtimes and consumption of accessible, but often unhealthy, snack foods and alcohol can become common habits due to the absence of convenient access to perishable fruits and vegetables and facilities to prepare them (Nelson et al., 2008; Sternman Rule & Jack, 2019). These eating behaviors, while practical given the food environment, increase the likelihood of engaging in unhealthy eating habits in a similar manner to that of food insecurity (Bruening et al., 2016; Nikolaus et al., 2019). The availability of healthy food options on campus may be limited, and even if students have the self-efficacy to consume fruits and vegetables and/or significant financial resources, they may face significant barriers in accessing and/or preparing these nutritious foods (Fernandez et al., 2019; Nikolaus et al., 2019). Several studies have found links between food security and food preparation. For example, several studies have found that students with marginal to high food insecurity report lower agency for cooking and are less likely to prepare their meals at home (Knol et al., 2019; Leung et al., 2019). Access to cooking facilities has been cited in other studies as an impediment to consuming healthier foods among college students (Lacaille et al., 2011). Therefore, even students with high self-efficacy in their ability to eat healthy may struggle to actually do so if they lack consistent access to nutritious food and facilities to prepare it.

The campus food environment, with its prevalence of fast food and convenience options, can undermine the impact of self-efficacy on actual fruit and vegetable consumption (Bruening et al., 2016; Nikolaus et al., 2019). The prevalence of fast-food outlets and easily accessible, low-nutrition food options on college campuses can mirror the experiences of individuals with low food security in the broader community. The abundance of these less nutritious food choices can hinder the intake of healthier alternatives, such as fruits and vegetables (Davison et al., 2015; Thompson et al. 2015). Further research is necessary to discern which eating behaviors can be

attributed to food insecurity, which to the culture and responsibilities of all college students, and which are the latter conditional by the former.

Leung and colleagues (2019) found that food-insecure students often struggle to find time to plan or prepare meals due to competing demands from their family, work, school, and social commitments. This finding is further supported by Knol and colleagues (2019), who reported that as college students' weekly work hours increased, so did their likelihood of experiencing food insecurity. These findings, which are supported by the results of the current study, suggest that food-insecure students often struggle to prioritize meal planning and preparation because they are juggling multiple demands on their time and resources. This lack of structure in their food-related routines may contribute to their food insecurity and make it more difficult for them to maintain a healthy diet.

In contrast, students from higher income backgrounds are more likely have more stable schedules, fewer competing responsibilities, and more resources (e.g., time, money, kitchen access, cooking utensils) that enable them to plan and prepare meals consistently. Self-efficacy is a critical component in meal preparation (Knol et al., 2019) and therefore, when there are time and resources to engage in meal preparation, self-efficacy is critical. Therefore, in order to better understand the nuanced relationships between dietary self-efficacy, food insecurity, and fruit and vegetable consumption, it may be necessary to include a direct measure of socioeconomic status.

The perception of the meals and language used in the food insecurity scale may also be an important consideration. The food insecurity items on the scale used for the current study asked about well-balanced meals but did not specifically ask about fruits and vegetables (Bruening et al., 2016; Nikolaus et al., 2019). Considering the irregular meal patterns and high rates of snacking among college students, it may be beneficial to ask more directly about how

their ability to eat fruits and vegetables are impacted by food insecurity, access, and availability. Similarly, items directly addressing proximity and access to fresh and affordable produce as well as storage and preparation facilities could provide additional nuance.

Beyond food access and availability – several other potential confounding factors that are connected to food insecurity and eating behaviors must be considered. For example, the unique challenges faced by international students, who are at higher risk of food insecurity compared to domestic students, highlight the importance of considering international student status as a key factor in future studies (Maroto et al., 2015; Payne-Sturges et al., 2018). Similarly, where students live, such as on-campus with meal plans versus off-campus, has also been associated with food insecurity risk, with those living off-campus without meal plans being more vulnerable (Bruening et al., 2016; Payne-Sturges et al., 2018). As this study also includes retrospective reports of controlling food parenting practices in childhood, it would be helpful to also consider socioeconomic status and food security in childhood, as experiences of poverty in childhood have been linked to childhood memories of food (Neuman et al., 2021).

Food insecurity is a complex and multidimensional construct, and the current study's findings suggest that it may not moderate the relationships examined. This does not mean that food insecurity should be discounted, but rather that it should be examined in its complexity, considering factors such as international student status, living arrangement, socioeconomic status, and food insecurity experienced during childhood. By exploring the nuances of food insecurity in this population, researchers can gain a deeper understanding of the factors that influence dietary behaviors and develop more effective interventions to support food-insecure college students.

Limitations and Future Directions

The current study is subject to several limitations that warrant consideration when interpreting its findings. First, the reliance on self-report measures, particularly for the retrospective assessment of controlling food parenting practices and fruit and vegetable consumption, introduces potential recall and social desirability biases. Although such measures are prevalent in social science research for their simplicity and feasibility in large-sample surveys, future research could enhance the validity of findings through the incorporation of observational or longitudinal data. Employing alternative methods like ecological momentary assessment, daily dietary diaries, or food intake recording apps could also mitigate recall bias and refine the accuracy of dietary intake data.

Second, this study's focus on emerging adults, defined by the "traditional college age," encounters the challenge of changing college student demographics. Our sample, sourced from Prolific and Cornell University, may not fully represent this demographic shift, potentially overrepresenting older, non-traditional students, as those students are more likely to be participating in surveys for money through programs like Prolific. Despite this, the majority of participants fell within the 18-25 age range, characteristic of emerging adulthood. Also, it may be beneficial to overrepresent non-traditional students, as those students are most likely to be in need of support. Future research should explore these associations in more detail, breaking down factors such as socioeconomic status, living arrangement, campus meal plan participation, and age, as these factors may influence the associations between controlling food parenting practices, dietary self-efficacy, and eating behaviors in the context of food insecurity (Bruening et al., 2017; Hagedorn et al., 2019).

Third, age, gender, race/ethnicity, and year in school were controlled for in each of the models. While this helped to minimize potential for confounding variables, it may be helpful in future studies to minimize the amounts of restrictions on the models.

Fourth, assessing food insecurity in childhood would provide valuable insights into how it is associated with parental controlling behaviors. Some literature has suggested that childhood food insecurity may be linked to parenting practices and likely predictive of current food insecurity, which in turn affects self-efficacy (Fram et al., 2015). Future studies could model these more complex associations using longitudinal data to better understand the interplay between childhood food insecurity, parental control behaviors, dietary self-efficacy, and fruit and vegetable consumption.

Fifth, the study collected data on dietary self-efficacy at the same time as the variables, precluding the examination of dietary self-efficacy as a predictor. Future research could address this limitation by employing longitudinal designs to model these associations more comprehensively and establish additional temporal precedence.

Sixth, the study would benefit from using a more comprehensive variable to assess outcomes related to healthy eating patterns. Additionally, it is important to consider how participants conceptualized fruit and vegetable intake, particularly regarding the consistency in their understanding of a "serving." Future research should aim to use measures with established reliability and validity to ensure the accurate assessment of these constructs.

Seventh, the term "self-efficacy" is often used interchangeably with or as a proxy for various domains of eating related self-efficacy, such as healthy eating, dieting, weight control, cooking, and meal preparation in the existing literature which provided the foundation for this study. This broad application of the term, however, introduces complexities in research,

particularly when attempting to aggregate findings across studies that, despite employing the term "self-efficacy," may not be assessing the same underlying constructs. However, other than a few notable exceptions (e.g., Nastaskin & Fiocco, 2015), the results are largely similar with general and various domain specific eating behaviors resulting in similar positive associations with expected health behaviors, as demonstrated in the review above.

Finally, the measure of food insecurity used in this study (Wright, 2022) was specifically adapted for college students; however, it still may not have captured all relevant aspects of food insecurity among this population. By oversimplifying the role of food insecurity as a moderator, the hypotheses may have failed to capture the nuanced ways in which different dimensions of food insecurity can impact dietary behaviors. The complex interplay between access and affordability of foods, and perception of a balanced or sufficient meal, coupled with self-efficacy, could have weakened the potential for identifying expected relationships, leading to the non-significant findings. Future research should consider using more comprehensive measures that account for the unique challenges faced by college students, such as food access and availability on campus. The intersection of food access and food insecurity emphasizes the need to consider both aspects comprehensively, as students' access to food resources can vary over time and may be influenced by factors like academic breaks and alternative funding sources (Nikolaus et al., 2020). This calls for a shift in the framework used to understand food insecurity, recognizing the role of both financial and non-financial contributors to the issue, which may require consensus within the scientific community. Ultimately, in the unique food environment of college campuses, food access and food insecurity are intertwined forces that must be considered in tandem to comprehensively address the dietary challenges faced by students.

Considering the limitations of the current study, I intend to pursue a grant for a mixed-methods research project. This approach would incorporate the measures used in the present study, while also including additional items to explore the nuance of food insecurity and dietary self-efficacy in greater depth. The quantitative component would involve a similar survey to the one used in the current study while including additional items to further delve into the nuance of food insecurity and dietary self-efficacy. However, the qualitative aspect would involve interviewing participants to gain a deeper understanding of their interpretations of key language in the food insecurity measure (Wright, 2022), such as "balanced meals"/"meals" and "could not afford"/"didn't have enough money" to provide a greater understanding of the responses to the food insecurity measure and address the potential for varying interpretations.

Additionally, the proposed mixed-methods study would delve deeper into the dietary self-efficacy items to explore varying interpretations of "I am able to" (Wilson-Barlow et al., 2014). This would aim to differentiate between ability and outcome expectations, and to investigate the nuance in the factors that individuals perceive to be affecting their abilities and outcome expectations. By conducting a more in-depth, item-specific analysis, the proposed study would highlight the specific opportunities for mastery that are not directly measured in the composite scores used for dietary self-efficacy in the current study.

Implications

The findings of this study have several important implications for future research and the promotion of healthy eating behaviors among college students. By examining the complex interplay between controlling food parenting practices, dietary self-efficacy, and food insecurity, this study highlights the need for a multifaceted approach to understanding and addressing dietary behaviors in this population. From a research perspective, the novel findings of this study

underscore the importance of considering the ecological systems which encompasses family dynamics and environmental context, as emphasized in Bronfenbrenner's ecological systems theory. Moreover, the findings underscore the relevance of Bandura's social cognitive theory in understanding the mechanisms through which early food parenting practices influence later dietary behaviors and elevating domain-specific self-efficacy as a critical component of health behaviors. While the effect sizes of parenting practices on children's fruit and vegetable intake may be small, it is important to recognize the significant role that other factors, such as taste, preference, and peer influences, play in shaping eating behaviors. Future research should address this complexity and explore how various ecological factors interact to influence children's dietary habits.

The impact of the COVID-19 pandemic on fruit and vegetable consumption among college students further highlights the need for interventions that address both individual and systemic factors. Pandemic-related stress was found to have a significant impact on food insecurity and an inverse impact on personal agency to consume fruits and vegetables (Levy et al., 2022). This suggests that during periods of high stress, interventions that promote dietary self-efficacy and address food insecurity are more critical than ever for this population.

The findings of this study emphasize the need for colleges and universities to prioritize efforts to promote dietary self-efficacy among their students. Interventions aimed at promoting healthy eating and how to access and prepare fresh produce among college students should incorporate strategies to enhance dietary self-efficacy, such as nutrition education programs and initiatives to improve the campus food environment (Dorling et al., 2019).

Furthermore, the study highlights the importance of early intervention efforts targeting controlling food parenting practices. The current study supports the premise that there is a need

for interventions that go beyond simply providing nutrition education to parents. While parents generally report knowing what foods are more nutrient rich and beneficial for their children, and even report a level of awareness of the potential negative effects of restrictive and controlling feeding practices on their children's developing attitudes towards food, they often struggle to find alternative strategies and desire more guidance on how to effectively communicate about healthy eating (Hart et al., 2015).

This underscores the importance of developing interventions that focus on providing parents with practical, evidence-based strategies for promoting healthy eating habits in their children. These interventions should aim to equip parents with the skills and tools they need to respond to their child's individual circumstances and foster a positive relationship with food. By shifting the focus from nutrition knowledge alone to effective health communication and food parenting practices, interventions can better support parents in their efforts to promote healthy eating behaviors in their children. Interventions that promote positive parenting practices and encourage the development of children's autonomy in making healthy food choices may have lasting benefits for their dietary self-efficacy and eating behaviors in adulthood.

Therefore, the findings of the current study underscore the need for a comprehensive, multi-level approach based upon the principles of ecological systems theoretical framework and social cognitive theory to promote healthy eating behaviors among college students. By supporting parents in developing more positive and effective, less controlling, food parenting practices when children are young and by addressing individual factors, such as dietary self-efficacy. Future research should continue to explore the complex interplay between these factors and identify effective strategies to support healthy eating behaviors across the lifespan.

Conclusion

The current study aimed to investigate the complex relationships between controlling food parenting practices, dietary self-efficacy, food insecurity, and vegetable consumption among college students. Findings indicate that dietary self-efficacy is a significant predictor of fruit and vegetable consumption among college students. Higher levels of dietary self-efficacy were associated with increased vegetable intake, underscoring the importance of fostering a strong sense of self-efficacy in promoting healthy eating behaviors. This finding aligns with the principles of Bandura's social cognitive theory (Bandura, 1986), which emphasizes the role of self-efficacy in shaping health-related behaviors.

The analysis of the hypothesized moderated mediation model revealed that controlling food parenting practices, and specifically the subdomain of restriction, experienced during childhood have a significant negative impact on college students' dietary self-efficacy. This suggests that more controlling and restrictive food parenting practices may undermine an individual's confidence in their ability to make healthy food choices and maintain a balanced diet. This finding is consistent with previous research that has highlighted the potential detrimental effects of overly restrictive or controlling parental feeding styles on children's long-term eating behaviors and attitudes towards food (Birch & Fisher, 2000; Loth et al., 2016).

Interestingly, the direct effect of controlling food parenting practices on vegetable consumption, independent of dietary self-efficacy, was not significant. This suggests that the influence of early controlling food parenting practices on later dietary behaviors may be largely mediated by the development of dietary self-efficacy. In other words, the impact of parental feeding styles on college students' vegetable intake appears to operate primarily through its influence on their confidence in making healthy food choices. The findings provide valuable insights into the mechanisms through which these factors interact to influence dietary behaviors

in this population. The findings in this study highlight the importance of fostering dietary self-efficacy to promote healthier eating habits among college students. Interventions aimed at improving dietary behaviors should consider both the direct effects of controlling food parenting practices and the mediating role of dietary self-efficacy, while additional research into the complex experience of food insecurity is needed.

In conclusion, this study sheds light on the complex interplay between controlling food parenting practices, dietary self-efficacy, food insecurity, and fruit and vegetable consumption among college students. The findings underscore the importance of fostering a strong sense of dietary self-efficacy in promoting healthy eating behaviors, while also highlighting the need for additional research into the unique food environment for college students. Future interventions aimed at improving dietary habits among college students should address multiple levels of influence and consider targeting parents of young children for autonomy promoting food parenting strategies and college students to support dietary self-efficacy, in order to promote sustainable behavior change. By taking a comprehensive approach that addresses multiple levels of influence on dietary behaviors, we can more effectively support college students in developing and maintaining healthy eating habits that promote long-term health and well-being.

Appendix A

IRB Notice of Exemption – Cornell University

Cornell University
Office of
Research Integrity and Assurance

Institutional Review Board for Human Participants
Cornell University
395 Pine Tree Road, Suite 320
Ithaca, NY 14850
https://researchservices.cornell.edu/offices/IRB

Institutional Review Board for Human Participants

NOTICE OF EXEMPTION

To:	Christopher Davis (cjd248)
Protocol Number:	IRB0147943
Protocol Title:	Examining the Role of Purpose and Perceived Control in the Relationship Between Early Parental Food Communication and College Eating Behaviors
Approval Date:	12/22/2023
Expiration Date:	None

Your protocol has been granted exemption from IRB review according to Cornell IRB policy and under the Department of Health and Human Services Code of Federal Regulations 45CFR46.104(d).

Please note the following:

- Investigators are responsible for ensuring that the welfare of research subjects is protected and that methods used and information provided to gain participant consent are appropriate to the activity. Please familiarize yourself with and conduct the research in accordance with the ethical standards of the Belmont Report.
- Investigators are responsible for notifying the IRB office of change or amendments to the protocol and acquiring approval or concurrence **BEFORE** their implementation.
- Progress reports, requests for personnel or other administrative changes, or requests for continuation of approval are not required for the study. However, upon conclusion of the study, please submit a Project Closure request through RASS-IRB.

For questions related to this application or for IRB review procedures, please contact the IRB office at irbhp@cornell.edu or 607-255-6182. Visit the IRB website for policies, procedures, FAQs, forms, and other helpful information about Cornell's Human Participant Research Program.

Appendix B

IRB Response – Syracuse University

Syracuse University

INSTITUTIONAL REVIEW BOARD
MEMORANDUM

TO: Rachel Razza
DATE: January 17, 2024
SUBJECT: **IRB Review Not Required**
IRB#: 24-003
TITLE: *Examining the Role of Purpose and Perceived Control in the Relationship Between Early Parental Food Communication and College Eating Behaviors*

It has been determined by the Office of Research Integrity and Protections that the information submitted pertaining to the above referenced protocol does not meet the definition of human subjects research ("a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge involving any intervention or interaction with a living individual about whom an investigator conducting research obtains data through an intervention or interaction, or identifiable private information.") and does not require IRB oversight for the following reason/s:

Not Human Subjects Research – Researchers will not interact with participants. They will conduct data analysis on de-identified data collected by Cornell University via Qualtrics/Prolific.

Should there be any change in the nature of the activity originally proposed (e.g., testing results used for research purposes), a new protocol application specific to these changes must be submitted. Thank you for your cooperation in our shared efforts to assure that the rights and welfare of people participating in research are protected.

Sincerely,

Tracy Cromp,
Director
Office of Research Integrity and Protections

DEPT: FALK Human Development & Family Science, 144D White Hall

CC: Caitlin Smith

Office of Research Integrity and Protections
214 Lyman Hall, 100 College Place
Syracuse, NY 13244

T: 315.443.3013
orip@syr.edu

Appendix C

Informed Consent

Informed Consent

We are asking you to participate in a research study titled "Individual Differences and Eating Habits in College." We will describe this study to you and answer any of your questions. This study is being led by Christopher Davis, a graduate student in the Psychology Department at Cornell University and Caitlin Smith, a research aide in the Bronfenbrenner Center of Translational Research at Cornell University. This study is being conducted under the guidance of Dr. Anthony Burrow in the Psychology Department at Cornell University.

What the study is about:
This study explores how childhood food communication from parents and personality traits affects college students' eating habits.

What we will ask you to do:
We will ask you to complete a series of brief surveys about your eating habits, the role of and personality traits (20 minutes).

Risks and discomforts:
We do not anticipate any risks during or after this process from participating in our study. You may discontinue participation at any time. If you choose to discontinue participation prior to fully completing the survey you will receive payment of $0.50.

Benefits:
Information gleaned from this study may give insights into key facets of identity development and the role that peers play on one's sense of purpose.

Compensation for participation:
You will receive $2.00 for your participation in this study. If you are unable to complete the study fully, you will receive $0.50. If you choose not to participate in this research study, please consult your Prolifics study portal where you can participate in other research studies.

Privacy/Confidentiality/Data Security:
We are not collecting identifiable information (i.e. name, student ID number, etc.). Deidentified data from this study may be shared with the research community at large to advance science and health. We will remove or code any personal information that could identify you before files are shared with other researchers to ensure that, by current scientific standards and known methods, no one will be able to identify you from the information we share. Despite these measures, we cannot guarantee anonymity of your personal data.

Taking part is voluntary:
Your participation in this study is voluntary. You may refuse to participate before the study begins, discontinue at any time, or skip any questions/procedures that make you feel uncomfortable, with no penalty to you and no effect on your academic standing, record, or relationship with the university. Please note that completion of all materials is required for participation, however if you withdraw early you will still receive $0.50 for the time involved. You may choose not to participate if you are uncomfortable with these conditions.

If you have questions:
The main researcher conducting this study is Christopher Davis- a Graduate Student at Cornell University- and Caitlin Smith- a Research Aide at the Bronfenbrenner Center for Translational Research at Cornell University. This research is conducted under the guidance of Anthony Burrow, an Associate Professor at Cornell University. Please ask any questions you have now. If you have questions later, you may contact Caitlin Smith at css299@cornell.edu. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) for Human Participants at 607-255- 5138 or access their website at http://www.irb.cornell.edu. You may also report your concerns or complaints anonymously through Ethicspoint online at www.hotline.cornell.edu or by calling toll free at 1-866-293-3077. Ethicspoint is an independent organization that serves as a liaison between the

University and the person bringing the complaint so that anonymity can be ensured

Appendix D

Questionnaire

After reading the informed consent, would you like to participate in this study?
Please indicate your selection with an "x" on the "Yes" or "No" option below.

- ◯ Yes
- ◯ No

Note: Prior to approving payment, we will be checking for the quality of responses for each submission. To better ensure increased qualities of your responses, please be sure to follow prompts and answer thoughtfully. Thank you!

Demographics

What is your age?

What is your year in school?

- ◯ Freshman
- ◯ Sophomore
- ◯ Junior
- ◯ Senior
- ◯ 5th year or higher undergraduate
- ◯ Graduate or professional degree

What is your gender identity?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

What is your race/ethnicity?

- ○ American Indian or Alaska Native
- ○ Asian or Asian American
- ○ Black or African American
- ○ Hispanic/Latine
- ○ Middle Eastern
- ○ Multiracial
- ○ Native Hawaiian or Other Pacific Islander
- ○ White (Non-Hispanic/Latine)
- ○ Other: _____
- ○ Prefer not to say

Food Insecurity

On a scale of 1 (strongly disagree) to 5 (strongly agree), rate how much you agree or disagree with the following five statements during the last 12 months.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I have reduced the size of my meals because I didn't have enough money for food	○	○	○	○	○
I have skipped meals because I didn't have enough money for food	○	○	○	○	○
I have taken a day off from eating because I didn't have enough money for food	○	○	○	○	○
I could not afford to eat balanced meals	○	○	○	○	○
I was concerned that my food would run out before I had the money to buy more.	○	○	○	○	○

Dietary Self-Efficacy

Please rate how much you agree or disagree with the following statements.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I am able to consume fruits and vegetables in most of my meals.	○	○	○	○	○
I am able to eat a variety of healthy foods to keep my diet balanced.	○	○	○	○	○
Based on my knowledge of nutrition, I am able to choose healthy foods at restaurants and from stores.	○	○	○	○	○
I am able to modify meals to make them healthier.	○	○	○	○	○
I am able to choose meals based on nutritional value.	○	○	○	○	○
If I choose to indulge in unhealthy food, I am able to appropriately compensate later.	○	○	○	○	○
When I feel hungry, I am able to easily choose healthy food over less healthy options	○	○	○	○	○

Fruit and Vegetable Intake

How many servings of fruit do you eat on a typical day?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 or more

How many servings of vegetables do you eat on a typical day?

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 or more

Parental Influence

Please choose the level of frequency that best reflects your experience in childhood through middle school.

	Never	Rarely	Sometimes	Frequently	Always
My parents limited the number of servings I had at meal-time.	○	○	○	○	○
Food was hidden from me, or kept out of my	○	○	○	○	○
I was only allowed to eat at designated times and dictated when I was allowed to eat.	○	○	○	○	○
My parents kept track of the amount of sweets I ate (candy, ice cream, pies, pastries)	○	○	○	○	○
My parents kept track of the snack foods I ate (chips, nuts, popcorn, etc.)	○	○	○	○	○
My parents dictated what I was allowed to eat.	○	○	○	○	○
My parents dictated how much I was able to eat.	○	○	○	○	○

Office Dictation

Please rate how you much you agree that the statement reflects your experience in childhood through middle school.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
My parents always pushed me to eat all of the food on my plate	○	○	○	○	○
My parents were always careful to make sure I ate what they felt was enough	○	○	○	○	○
If I said "I'm not hungry", my parents tried to get me to eat anyway	○	○	○	○	○
My parents guided and regulated my eating to make sure I did not eat less than they thought I should	○	○	○	○	○

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CAITLIN S. SMITH

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EDUCATION

Ph.D. Candidate in Human Development — Degree Anticipated May 2024
Syracuse University, Syracuse NY
Dissertation: Exploring the Roles of Food Parenting Practices, Dietary Self-Efficacy, and Food Insecurity on Fruit and Vegetable Consumption Among College Students
Advisor: Dr. Rachel Razza
Committee: Dr. Adam Anderson (Cornell); Dr. Sara Vasilenko (SU)

Certificate of Advanced Study in Food Studies — May 2021
Syracuse University, Syracuse NY

M.A. in Teaching — Jun 2016
Relay Graduate School of Education, Manhattan, NY

B.A. in Political Science; International Education Policy; Human Rights — Dec 2009
University of Connecticut, Storrs, CT

TEACHING EXPERIENCE

Grader. HFS 201: Family Development
Freshman to Senior In-Person Lecture: Theoretical and functional approach to marital and family life with a developmental perspective
- Fall 2023 – 75 students
- Spring 2023 – 85 students

Adjunct Professor. HFS 201: Family Development
Freshman to Senior In-Person Lecture: Theoretical and functional approach to marital and family life with a developmental perspective; issues related to marital and parental careers
- Fall 2022 – 76 students

Lead Instructor. FYS 101: First Year Seminar
Freshman In-Person Seminar: Guided conversations, experiential activities, and written assignments about belonging, interdependence, health and wellness, development of identity, socialization, prejudice, discrimination, bias and stereotypes
- Fall 2022 – Section 1: 21 students
- Fall 2022 – Section 2: 20 students

Teaching Assistant. HFS 425: Lust, Love, and Relationships
Freshman to Senior Lecture: Concepts, theories, and functions of intimacy, attachment, love, attraction, and communication in romantic relationships
- Spring 2022 (in-person) – 69 students
- Spring 2021 (virtual) – 73 students

Teaching Assistant. HFS 388: Human Sexuality
Freshman to Senior In-Person Lecture: Human sexuality within the individual and relationships; multicultural and multiethnic aspects of sexuality, and alternative to conventional sexual behavior
- Spring 2021 – 49 students

Instructor of Record. HFS/SPM 327: Human Development and Sport
Freshman to Senior Seminar: Dynamics of youth and community development, social justice, and health in the context of sport
- Fall 2022 (in-person) – 37 students
- Fall 2021 (hybrid transition to virtual) – 23 students

Teaching Assistant. HFS 204: Applied Research Methods
Sophomore to Senior Seminar and Lab: Evaluation of social science research methods; development and practical application of research skills
- Spring 2021 (hybrid) – 17 students
- Spring 2020 (in-person transitioned to virtual) – 11 students

Instructor of Record. SEM 100: First Year Experience
Freshman In-Person Seminar: Diversity, inclusion, belonging, community, and health and wellness seminar for incoming students
- Fall 2019 – 18 students

Teaching Assistant. HFS 204: Applied Research Methods
Sophomore to Senior In-Person Seminar and Lab. Evaluation of social science research methods; development and practical application of research skills
- Fall 2019 – 26 students

TEACHING AND SERVICE AWARDS

GEIC Outstanding Committee Member; Syracuse University GSO 2023
Outstanding Teaching Assistant Award; Syracuse University 2022
HDFS Outstanding Graduate Teaching Award; Syracuse University 2021

RESEARCH INTERESTS

My research interests are centered on the intersection of human development and health psychology, with a particular emphasis on the ecological and dynamic factors that shape self-efficacy and dietary behaviors in adolescence and emerging adulthood. My work is informed by a transdisciplinary perspective, as demonstrated by my diverse research projects which include the development and evaluation of mindfulness interventions, community food systems analyses, and an exploration of risk and protective factors during adolescence. I aim to conduct translational and community-based participatory research intended to produce sustainable and lasting transformative change, specifically supporting the development of healthy dietary behaviors from youth into emerging adulthood.

RESEARCH

*denotes undergraduate co-author

Publications

Brann, L. S., Razza, R. A., **Smith, C. S.** (2022). The Feasibility and Preliminary Effectiveness of a Mindfulness Intervention on Preschooler's Executive Function and Eating Behaviors. Early Education and Development, 1-18. https://doi.org/10.1080/10409289.2022.2154579

Revise and resubmit

Vasilenko, S.A., Liu, Q., **Smith, C.S.,** Millet-Joseph, T., Zhang, X., Bray, B.C. How do Multidimensional Classes of Risk and Protective Factors in Adolescence Predict Sexual Health Outcomes in Young Adulthood? Syracuse University, Syracuse, NY.

Manuscript under review

Smith, C.S., Burrell, J., Lyons, K., Vasilenko, S.A. Latent Classes of Adolescent Risk and Protective Factors Predict Metabolic Health in Early Adulthood. Syracuse University, Syracuse, NY.

Conference Posters/Presentations

Smith, C.S. (Upcoming - May 2024). Pathways to Dietary Self-Efficacy – Controlling vs. Controlled Feeding Environment in Middle Childhood.
Poster to be presented at ISBNPA Annual Meeting. Omaha, Nebraska

Mulvaney, M.K., **Smith, C.S.,** Jung, E. (Mar 2023). Building Community, Contacts, and Pathways to Careers: The Development of a Career Immersion Trip in a Human Development and Family Science Department.
Poster presented at SRCD 2023 Biennial Meeting – Teaching Pre-Conference. Salt Lake City, Utah

Razza, R.A., Brann, L., **Smith, C.S.,** Kearns, K. G., Davis, K., *Waters, A., & *Pepper, R. (Oct 2023). Parent and Teacher Assessment of a Mindful Eating Intervention for Preschoolers.
Flash Talk presented at Mindfulness, Self-Compassion, and Family Well-Being Conference. Seattle, WA

Smith, C.S. (Mar 2023). Child Fruit and Vegetable Consumption: Impact of Self-Efficacy, the Family Food Environment, and Neighborhood.
SRCD 2023 Biennial Meeting. Salt Lake City, Utah

Razza, R.A., Brann, L.S., **Smith, C.S.,** *Waters, A., Kearns, K. (Nov 2022). Cultivating Self-Regulation and Healthy Food Intake: A Novel Mindful Eating Intervention for Children and their Caregivers.
Poster presented at NAEYC 2022 Annual Conference. Washington D.C.

Smith, C.S., *Waters, A., Kearns, K., Razza, R.A., Brann, L.S. (Sep 2022). Development of a Holistic Mindful Eating Curriculum for Preschoolers, Parents and Caregivers.
Poster presented at SRCD Special Topic Meeting: Toward a Holistic Developmental Science: Catalyzing Transdisciplinary Multi-Sector Collaborations to Understand and Support Human Development. St. Louis, MO

Vasilenko, S., **Smith, C.S.,** Millet-Joseph, T. (May 2022). Profiles of Multidimensional Social-Ecological Risk and Protective Factors and Sexual Behavior.
Poster presented at SRCD Construction of the 'Other': Development, Consequences, and Applied Implications of Racism, Prejudice, and Discrimination. Rio Grande, Puerto Rico

Millet-Joseph T., Blake, C., **Smith, C.S**. (May 2022). Otherness in College: Latent Classes of Perceptions of Belonging and Representation Predict Mental Health Outcomes.
Poster presented at SRCD 2022 Construction of the 'Other': Development, Consequences, and Applied Implications of Racism, Prejudice and Discrimination. Rio Grande, Puerto Rico

*Waters, A., **Smith, C.S.,** Kearns, K. (Apr 2022). Mindful Eating Feasibility Study.
Poster presented at Falk Student Research Celebration. Syracuse, NY

Smith, C.S., Burrell, J., Vasilenko, S. (Mar 2022). Latent Classes of Adolescent Eating Patterns, Family, and Neighborhood Cohesion as Predictors of Metabolic Health in Early Adulthood.
Poster presented at SRA 2022 Conference. New Orleans, LA

Vasilenko, S.A., **Smith, C.S.,** Bray, B.C. (Apr 2021). Multidimensional Profiles of Adolescent Social-Ecological Risk and Protective Factors and Young Adult Sexual Behavior.
Poster presented at SRCD 2021 Biennial Meeting. Virtual

Vasilenko, S.A., **Smith, C.S.** (Mar 2021). Disparities in Sexual Behavior by Race/Ethnicity and Gender Across Adolescence and Young Adulthood.
Poster presented at SRA 2021 Conference. Virtual

Zhang, Y., Razza, R.A., Liu, Q., Reid, S., **Smith, C.S.,** Burrell, J. (Apr 2021). Longitudinal Implications of Children's Attentional and Behavioral Regulation: Positive Paths to Adolescents' Social Skills and Functioning Among Low-Income Families.
Poster presented at SRCD 2021 Biennial Meeting. Virtual

Razza, R., **Smith, C.S.,** & *Omole, A. (Mar 2021). Effectiveness and Feasibility of a Mindfulness Program for Urban Teens.
Flash talk presented at the Society for Research in Child Development 2021 Biennial Conference, Virtual Annual Conference.

Hosted Roundtable Discussion
Smith, C.S., (Mar 2023). Bridging the Divide Between Undergraduate Coursework and Research: A Synergistic and Scaffolded Approach
SRCD 2023 Biennial Meeting. Salt Lake City, Utah

RESEARCH POSITIONS

Research Assistant to Dr. Rachel Razza at Syracuse University Jan 2022 - Present
Mindful Eating Curriculum Development and Pilot Testing

- Develop curriculum materials for children, parents, and caregivers
- Support pilot testing of preschool curriculum
- Assess barriers to access and participation for parents and caregivers through focus groups
- Conduct evaluation of parent and caregiver materials through focus groups

HEART Lab at Syracuse University May 2021 - Present
Principal Investigator: Dr. Sara Vasilenko (HDFS)

Projects: Conducting secondary data analyses – specifically using the Add Health data set to examine adolescent eating behaviors, sexual risk behavior, and structural disadvantage

SELF Lab at Syracuse University Sep 2020 - Present
Principal Investigator: Dr. Rachel Razza (HDFS)
Projects: Conducting analyses of data collected among high school sample to evaluate Inner Strength Foundation; analyzing data from pilot study of mindful nutrition practices in schools
https://falk.syr.edu/selfregulation/lab-team/

Project Coordinator at the Community Neuroscience Initiative Jul 2020 - Present
Bronfenbrenner Center for Translational Research; Cornell University
Principal Investigators: Dr. Adam Anderson (Human Ecology) and Dr. Eve De Rosa (Human Ecology)

- Organize mindfulness interventions for pre-service teachers in the city of Syracuse
- Coordinate diverse teams, including undergraduate and graduate students, community partners, and faculty, to facilitate translational health research and teaching activities
- Developed and implemented a community-engaged food hub programming
- Designed and distributed surveys to local school food service directors, evaluating and disseminating data

Latent Modeling Discussion Group Summer 2020
Facilitators: Dr. Ryan Health (Social Work)
Responsibilities: Participate in monthly statistics sessions; read and review latent modeling reading and practice assignments; contribute to synchronous and asynchronous analysis and problem-solving sessions regarding latent modeling statistical and conceptual analysis.

Reviewing Experience

International Journal of Child Care and Education Nov 2021

- Reviewed journal article under mentorship of Dr. Rachel Razza

2021 SRCD Biennial Meeting - Panel 10: Health, Growth, Injury conference submissions Oct 2020

- Reviewed 12 health behavior poster abstracts under mentorship of Dr. Sara Vasilenko

RESEARCH AWARDS

SRCD Early Career Transdisciplinary Fellowship – $2,600; SRCD and NSF 2022
Dean Edith Smith Dissertation Grant – $2,000; HDFS department, Syracuse University 2022
Summer Dissertation Fellowship – $4,000; Syracuse University 2022
3 Minute Thesis – Top 10 Finalist; Syracuse University 2022
Dissertation Funding – $2,000; HDFS department, Syracuse University 2022

SERVICE TO UNIVERSITY COMMUNITY

Graduate Student Organization (GSO). Syracuse University
Graduate Employment Issues Committee (GEIC) Aug 2022 - Present

- Engaged in advocacy and support for graduate students by analyzing concerns about work conditions, and liaising with university entities to improve employment conditions
- Conducted comprehensive data collection and analysis on graduate student issues, including stipends, benefits, and workload, to inform strategic reports for the GSO Executive Board and university administration

HDFS Academic Program Senator Spring 2023

- Attended monthly meetings to engage in senate processes including but not limited to debate, funding allocation votes
- Developed resolutions to support resolution development and votes, and calls to action to university administration

Mentoring Experience. Syracuse University Aug 2021 – Present

- Provide comprehensive mentorship to undergraduate and graduate students in HDFS, Education, and Public Health, leveraging expertise to guide them through academic and personal challenges
- Facilitate connections between students and advisors, enhancing their research and career trajectories, while also coaching undergraduates in project management, critical analysis of scholarly articles, and development of research questions
- Assist undergraduates with practical skills for career advancement, including preparing for internships and job applications, and offer tailored personal and academic mentoring to support their overall growth
- Guide graduate students through the intricacies of academia, including effective teaching assistantship, classroom instruction, managing coursework, initiating research projects, and strategically selecting the right advisor

HDFS Graduate Group. Syracuse University
Co-Founder and Member July 2020 – Present

- Provide example materials for developing syllabi, student communication, job application materials for current leadership to lead workshops
- Participate in biweekly teaching and research workshops
- Participate in monthly professional development sessions
- Support planning for semesterly graduate community social events

President AY 2021 – 2022

- Developed and facilitated monthly teaching workshops including but not limited to subjects including teaching presence, grading and feedback, difficult conversations
- Developed and led community-building events and biweekly meetings for graduate students, fostering a collaborative environment
- Established a graduate student newsletter, conducted research colloquia with external faculty, and developed surveys to assess and address graduate student needs, leading to informed program planning and advocacy efforts

Teaching Mentor. Graduate School, Syracuse University Feb 2021 - Jul 2023

- Independently facilitated in-person and virtual microteaching and feedback sessions during summer and school year
- Co-facilitated microteaching and feedback sessions specifically designed for international students

- Ran multiple small group sessions in person and virtually to support incoming graduate assistants
- Prepared and taught two live in-person sessions on Teaching in Social Sciences and Humanities to 75+ incoming teaching associates
- Prepared (including creating, editing, and captioning for accessibility) and presented one recorded virtual/asynchronous session on Teaching in Social Sciences and Humanities for approximately 50 incoming teaching associates
- Reviewed and provided feedback on virtual Introduction to Teaching modules created by faculty and graduate students at Syracuse University and Le Moyne College
- Developed and facilitated multiple workshops on creating a teaching portfolio
- Reviewed teaching portfolios and conducted interviews for applicants for Teaching Mentor position

Graduate Representative. HDFS Undergraduate Committee, Syracuse University AY 2021 - 2022

- Represented graduate student interests in undergraduate affairs by reviewing and suggesting improvements to curriculum, program development, and strategies for attracting and retaining students, with a focus on fostering community and student group engagement
- Advocated for undergraduate student experience enhancement through active participation in committee meetings, contributing to the development of academic and extracurricular initiatives aimed at building a supportive and inclusive departmental culture
- Actively participated in the fall 2022 HDFS Career Immersion Trip planning, handling logistics, student selection, and preparation of necessary documentation
- Chaperoned the fall 2022 HDFS Career Immersion Trip, ensuring a safe and enriching experience for all participants

RELEVANT PROFESSIONAL DEVELOPMENT

Professional Affiliations

Society for Research on Adolescence (SRA)
Society for Research in Child Development (SRCD)
Future Professoriate Program at Syracuse University

2020 Certificate in University Teaching (CUT): Awarded by the Graduate School, Syracuse University
Completed Certificate of Teaching Seminars

- Efficient and Effective Assessment
- Universal Design for Learning: Foundations and Applications
- Inclusive Teaching in the College Classroom
- Crafting Your Teaching Philosophy
- Leading an Effective Classroom Discussion? Questions Are the Answer
- Online Teaching and Learning: Challenges and Opportunities

CITI Certification – *Human Subjects Research*
Completion date: Jan 28, 2022 – Expiration date: Jan 27, 2025