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Psychosocial Influences On and Behavioral Characteristics of Young Adult Food Addiction

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Psychosocial Influences on and Behavioral Characteristics of Young Adult Food Addiction

Rachel Anne Wattick

Dissertation submitted
To the Davis College of Agriculture, Natural Resources, and Design at West Virginia University

In Partial Fulfillment of the requirements for the degree of Doctor of Philosophy in Animal, Food, and Nutrition Science

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Morgantown, West Virginia
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Keywords: Food Addiction, Eating Behavior, Psychosocial, College, Young Adult

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ABSTRACT

Psychosocial Influences on and Behavioral Characteristics of Young Adult Food Addiction

Rachel A. Wattick

Introduction. Research on food addiction has increased in recent years, but there are few studies focusing on college-attending young adults, who may be at risk of developing food addiction due to the stress of the college environment. Additionally, causes and characteristics of food addiction are under-explored.

Aim. This dissertation aims to 1) determine the impact of adverse childhood experiences (ACEs) and other early life influences on the development of food addiction in college-attending young adults and 2) determine the psychosocial and behavioral characteristics of young adults with food addiction.

Methods. A sequential explanatory mixed-methods design was used for aims 1 and 2, in which quantitative data is collected first, analyzed, and then qualitative data is then collected. An online, cross-sectional survey was distributed to students attending a university in Appalachia in fall 2021. Food addiction was measured using the Yale Food Addiction Scale 2.0 (YFAS 2.0). Childhood trauma, depression, anxiety, stress, social support, post-traumatic stress disorder (PTSD), emotion regulation, coping styles, eating disorder symptoms, eating styles, diet quality, and anticipated effects of food were measured using validated tools. Demographic data and self-reported height and weight were also collected. For Aim 1, logistic regression was used to determine the impact of ACEs on the development of food addiction while controlling for other potential influences. For Aim 2, Kruskal-Wallis H was used to determine differences in mean scores of psychosocial and behavioral variables between those with and without food addiction. All quantitative analysis was analyzed using JMP Pro Version 16.0. For Aims 1 and 2, participants who met the criteria for food addiction were invited to participate in interviews that elicited more information on their causes and symptoms. Interviews were transcribed verbatim and thematic analysis was conducted using NVIVO software.

Results. Respondents (n=1645) had a 21.9% prevalence of food addiction (5.7% mild, 4.7% moderate, 11.5% severe). For Aim 1, only depression remained a significant predictor of food addiction (OR = 3.33, 95% CI 2.19, 5.05). Thematic analysis found that many participants grew up in restrictive eating environments characterized by diet culture, while others had positive memories associated with mealtime. Participants often stated symptoms emerged when transitioning to college or when mental health worsened. For Aim 2, participants with food addiction had significantly higher ACEs, depression, anxiety, stress, emotion dysregulation, use of negative coping mechanisms, eating disorder symptoms, emotional eating, disinhibition when eating, negative expectations after eating healthy or junk food, and intake of added sugars and saturated fat, and significantly lower social support, cognitive restraint, and vegetable intake. Thematic analysis found that participants had issues with mental preoccupation with food, using food to cope with emotions, and eating behaviors characterized by cycles of restricting and bingeing and negative emotions following eating. Participants expressed a desire to spend less time thinking about food and to learn how to follow moderation.
**Conclusion.** Findings from these studies demonstrate the significant psychosocial burdens faced by individuals with food addiction and provide evidence that the college student life-stage can put individuals at risk of developing food addiction. Further, food addiction can manifest after both negative and positive experiences with food during childhood. Future research should continue to explore this population to move toward developing treatments.
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List of Definitions

**Obesity:** abnormal or excessive accumulation of adipose tissue normally resulting from a chronic energy imbalance

**Food Addiction:** a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high pleasure, energy, or excitement, or to relieve negative emotional or physical states

**Hyperpalatable Food:** foods where the synergy between components of the food – such as fat, sodium (salt), sugar, and carbohydrates – makes it more appealing and potentially addictive

**Substance Use Disorder (SUD):** the recurrent use of alcohol and/or drugs that causes clinically significant impairment, including health problems, disability, and failure to meet major responsibilities at work, school, or home

**Body Mass Index (BMI):** a weight-to-height ratio, calculated by dividing one’s weight in kilograms by the square of one’s height in meters and used as an indicator of obesity and underweight

**Eating Disorder:** any range of psychological disorders characterized by abnormal or disturbed eating habits

**Disordered Eating:** unhealthy food and body behaviors, usually undertaken for the purpose of weight loss or health promotion, that may put the person at risk for significant harm

**Emotional Eating:** eating associated with emotional cues (e.g. anxiety)

**Cognitive Restraint:** the conscious restriction of food intake to control weight

**Uncontrolled Eating:** inability to refrain from eating

**Avoidant Coping:** cognitive and behavioral efforts oriented toward denying, minimizing, or otherwise avoiding dealing directly with stressful demands

**Problem-Focused Coping:** all the active efforts to manage stressful situations and alter a troubled person-environment relationship to modify or eliminate the sources of stress via individual behavior

**Emotion-Focused Coping:** functions to regulate (tolerate, reduce, or eliminate) the physiological, emotional, cognitive, and behavioral reactions that accompany the experience of stressful encounters

**Emotion Dysregulation:** patterns of emotional experience or expression that interfere with goal-directed activity
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Chapter 1: Introduction to the Study
Introduction

Obesity continues to increase and is a widespread and significant problem, with recent estimates of a 42.4% prevalence of overweight/obese individuals in the United States. Obesity is the abnormal or excessive accumulation of adipose tissue generally resulting from a chronic positive energy imbalance, and is linked to several other complications, including type 2 diabetes, coronary heart disease, and end-stage renal disease. Further, psychosocial complications arise from this disease, including decreased quality of life and weight-related stigma. The economic burden of obesity also continues to increase, costing the US and estimated $147 billion annually. Because of all the complications of this widely prevalent, multifactorial disease, decades of research have been conducted on obesity, but the exact causes are not yet fully known. A significant cause is the excess intake of calories through overeating, but it ultimately is caused by a complex interaction between an individual’s biology and environmental factors. For this reason, research on obesity has shifted towards examining its underlying etiology, with a focus on psychosocial risk factors.

Food addiction is a new construct in the field of obesity research that has no agreed upon definition, but can be defined as “a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high pleasure, energy, or excitement, or to relieve negative emotional or physical states”. Research into food addiction dramatically increased around 2009, when Gearhardt and colleagues developed the Yale Food Addiction Scale (YFAS), providing researchers with the ability to quantify and diagnose food addiction. Further contributing to the momentum of food addiction research is today’s food environment, in which highly-palatable foods are widely available, and an increase in consumption of food for pleasure rather than sustenance. Using the YFAS, prevalence estimates of food addiction range from 5-10% in a non-clinical sample, 15-25% in obese samples, and 30-50% in morbidly obese bariatric patients or obese individuals with binge eating disorder.

An individual’s early life experiences have a lasting impact on their mental and physical health. There is a strong body of research linking adverse childhood experiences (ACEs) with adulthood obesity and other metabolic risk factors. Although this relationship has been established, there is little consensus on the mediating mechanisms contributing to this association. Stress-induced overeating has been explored as a possible cause, as stress can cause a craving for hyper-palatable foods and dysregulate eating. ACEs and uncontrollable stressful events can disrupt an individual’s chronic stress response by altering the function of the hypothalamic-pituitary-adrenal (HPA) axis. Individuals with ACEs can develop maladaptive coping strategies to stress and other negative emotions, including overeating, and certain foods may buffer feelings of distress by triggering dopaminergic reward responses. Further exacerbating this problem is the effect stress can have on the reward systems, potentially reducing an individual’s ability to experience pleasure. Food addiction has been studied as a potential underlying mechanism for the association between ACEs and adult obesity. Similarly to drug-addicted individuals, individuals exhibiting food addiction display high activation of reward systems when anticipating a highly palatable
food intake\textsuperscript{19}. ACEs have been well-established to be linked to the development of a substance use disorder (SUD) in adulthood\textsuperscript{20}, and individuals with an SUD and individuals with obesity both display a reduced sensitivity to reward\textsuperscript{13,16,21}, which ACEs can also be a cause of\textsuperscript{12}. Reduced sensitivity to reward can lead to addictive behavior\textsuperscript{14}, and the American Society of Medicine defines addiction as “a primary, chronic disease of brain reward, motivation, memory, and related circuitry”\textsuperscript{22}. Given the similarities between individuals who develop SUDs and individuals with obesity, and the strong link between ACEs and adulthood obesity and between substance use disorder and obesity, the notion that ACEs can contribute to the development of food addiction is plausible. However, this relationship has not been well-studied to date.

Research thus far on food-addicted individuals has found that they have different neural responses to anticipation and images of food than non-food-addicted individuals\textsuperscript{23,24}, higher intake of fat and protein\textsuperscript{2}, and higher emotional dysregulation\textsuperscript{25}. Individuals who are food-addicted participate in emotional eating, or eating in response to negative emotions\textsuperscript{26}, and research on emotional eaters has found that they have high rates of depression and emotion dysregulation\textsuperscript{13}, and commonly use an avoidant coping style in response to stress\textsuperscript{17}. Although different from food addiction, these findings on emotional eating may help to inform characteristics of food-addicted individuals, as characteristics of these individuals are not well-studied. Despite a rapid growth in food addiction research, little is known about this population and potential causes of the development of food addiction. Further, there is very little investigation into the non-clinical population.

**Theoretical Foundation**

The construct of food addiction largely draws from the theoretical basis of substance use disorder. The framework is that individual risk factors interact with the addictive potential of a substance to result in pathology.\textsuperscript{9,27} In this case, the substance is hyper-palatable or ultra-processed foods, which have addictive potential.\textsuperscript{27} It is thought that individuals with food addiction have altered reward pathways.\textsuperscript{28} This could either be due to individuals who overeat having a hypersensitive reward system, which drives their motivation to consume energy-dense foods for pleasure\textsuperscript{28}, or a hyposensitivity to reward, leading to compulsive eating.\textsuperscript{28} This is a complicated relationship, but Figure 1 (right) provides a visual description.

![Figure 1. The proposed cycle of food addiction by Adams et al.](image-url)
There are also researchers who believe that food addiction follows a behavioral addiction framework. A behavioral addiction refers to a behavior that is highly rewarding, reinforcing, and alters the reward system. It differs from substance addiction in that no ingestion of a substance is required in order to cause symptoms. Proponents of the behavioral addiction framework argue that the act of eating itself is rewarding and reinforcing.

The idea that food, which is necessary for survival, has addictive potential is a result of a variety of socio-cultural-political factors. Humans were hardwired to eat an abundance of food to prepare for periods of starvation. Since then, our genetic makeup has not changed much, but our food environment has, which has the widespread availability of ultra-processed, energy-dense, high-sugar, high-fat foods. This has been described as an “evolutionary mismatch” by Gearhardt and Schulte, summarized in figure 2 below.

As this dissertation utilizes the YFAS, which was developed to align with the diagnostic criteria for SUD, it largely follows the substance use disorder framework. However, qualitative investigations into the actual symptoms and behaviors of young adults with food addiction will provide insight into how food addiction may follow a behavioral addiction framework.

Statement of the Problem

While the concept of food addiction is gaining increasing recognition in the clinical world, most of this research has focused on overweight/obese females over the age of 35, the bariatric surgery population, and eating disorder population. However, recent investigations have shown food addiction in non-clinical populations, with the highest prevalence being in the 18-29 year old age group, and was found in individuals across all BMI categories. These preliminary findings raise the notion
the food addiction can be present in individuals who are not overweight, and this needs further investigation. In addition, young adults in the general population can be at high risk of food addiction and are heavily influenced by the food environment. Further, college-attending young adults are at a formative period of their lives during which lifelong lifestyle behaviors are established. This time period can be characterized by high stress, weight gain, and the development of behavioral disorders. Therefore, they may be at high risk of developing good addiction as a response to stress or to cope with negative emotions. In general, little is known about the psychosocial and behavioral characteristics of individuals with food addiction. Therefore, it is important to examine underlying causes on the development of food addiction as well as current characteristics and behaviors of this population. This dissertation aims to provide an understanding of how food addiction develops and the emotional and behavioral tendencies of this population. Investigating this problem in college-attending young adults serves to gain recognition of its existence and to further understanding of potential treatments.

Purpose of the Study

This study has two aims: 1) Determine the impact of Adverse Childhood Experiences (ACEs) and other early life influences on the development of food addiction in college-attending young adults, and 2) Determine psychosocial and behavioral characteristics of college-attending young adults with food addiction. The overarching goal will be to further the understanding of the contributing factors to the development of food addiction and its psychosocial and behavioral implications in the non-clinical population. Institutional Review Board (IRB) approval for this study is available in Appendix A and survey tools to achieve these aims are available in the Appendix B and Appendix C.

Significance

Food addiction has become an increasingly recognized contributing factor to the development of obesity. Most of this research is focused on the clinical population, but the college-attending young adult population is at high risk due to their stressful college environment, the development of behavioral health disorders characteristics of this life-stage, and their influence by the food environment. Although food addiction can lead to the development of obesity, recent investigations have found food addiction present in underweight and normal weight young adults. This phenomenon needs further investigation and understanding the psychosocial and behavioral characteristics of young adults with food addiction will contribute to understanding of the problem. In addition, understanding causes of food addiction, such as childhood trauma, can inform potential treatment.

Summary

Within this document, Chapter 2 provides an in-depth review of the literature that provides background and justification for this dissertation. Chapter 3 provides a description of the research design and statistical analyses within this dissertation. Chapters 4 contains the results of the first study: Adverse Childhood Experiences in the
Development of Food Addiction in College-Attending Young Adults. Chapters 5 and 6 contain results from the second study: Psychosocial and Behavioral Characteristics of College-Attending Young Adults with Food Addiction. studies together will provide an enhanced understanding of contributing factors to the development of food addiction, its characteristics, and potential solutions. Chapter 7 will conclude the document with a discussion of the findings and recommendations for future research. Additional information, including survey scales, and supplementary tables and figures are included in the Appendix.
Chapter II: Additional Background and Literature Review
Introduction

This chapter provides a comprehensive review of food addiction in the clinical, general, and young adult population. West Virginia University libraries were used to collect literature. Databases accessed included PubMed, CINAHL, ScienceDirect, and WorldCat.org. When published literature was not available through these databases, West Virginia University’s InterLibrary Loan Internet Accessible Database (Illiad) was utilized. There were no restrictions for publication year, but the most recent food addiction findings were used for comparison. The aim of this review is to provide an understanding of food addiction, including its history, potential causes, comorbidities, prevalence, and implications, and to identify the gaps in literature to inform future research. Additional literature review is contained within each manuscript, provided in Chapters 4-6.

Origins of Food Addiction Research

The term food addiction first appeared in the scientific literature by Theron Randolph in 1956, who associated it with addictive drinking. In the decades to follow, comparisons between addiction and eating behavior were made, but efforts to define and examine food addiction drastically increased in the early 2000s. This increase was due to multiple co-occurring societal and research trends. Overweight and obesity, which are defined as the abnormal or excessive accumulation of adipose tissue generally resulting from a chronic positive energy imbalance, continued to increase at an alarming rate. Investigations into obesity largely focused on an excess of intake of calories, in which researchers and clinicians believed that if an individual has accurate information and motivation to change dietary intake, they can successfully reduce their caloric intake. Despite widespread efforts to address caloric intake, the prevalence of obesity remained an urgent public health issue, and the exact causes are not fully known. Ultimately, weight gain is a complex interaction of biology and environment, which can lead to excessive caloric intake. Examining etiology of overeating led to findings that overeating is associated with alterations in dopaminergic signaling as well as hyperactivation of reward-related brain areas, similar to the neurological processes of individuals addicted to drugs. Additionally, animal models showed addictive behaviors when exposed to hyperpalatable foods, or foods high in sugar or fat. Further adding momentum to the increased interest in the food addiction phenomenon was the changing food environment, increasingly characterized by the widespread availability of hyperpalatable foods, with a focus on eating for pleasure rather than sustenance. When Gearhardt and Colleagues developed the Yale Food Addiction Scale (YFAS) in 2009, researchers had the ability to diagnose food addiction, and publications on this topic drastically increased. Food addiction can be conceptualized as a health behavior or coping mechanism, with perspectives on this construct differing between whether it is a substance addiction or behavioral addiction. These perspectives are outlined below.

Food Addiction Similarities to Substance Addiction

When food addiction research began, the focus was on the addictive properties of hyperpalatable foods. Over the past 10,000 years, the human genome has not
changed much, but the food environment has. The human brain is still hardwired to eat more quantities of food in times of food abundance in order to prepare for periods of starvation. In the pre-industrial era, humans relied on minimally processed foods, with staples of proteins, grains, and produce, and foods containing fats and sugar were scarce. Humans adapted to motivate consumption of more foods high in sugar or fat, or calorically-dense foods. These foods, although calorically-dense, often contained either high amounts of sugar (such as fruit), or high amounts of fat (such as nuts), but not both. There is now increased access to and reliance on hyperpalatable foods, which contain many ingredients, including high amounts of refined flour, fats, salts, and sugar-sweeteners not found in nature, and further, are heavily marketed, cheap, and convenient. The food addiction framework posits that these foods have the ability to make people consume them in higher quantities than necessary and beyond reason, similar to addictive drugs. Addictive drugs are often derived from plant materials and processed to become more potent and more easily absorbed into the bloodstream; similarly, hyper-palatable foods undergo processing and refinement to be a highly concentrated form, such as high-fructose corn syrup or refined flour. This processing leads to much more rapid absorption into the bloodstream, largely due to the removal of fiber and protein. Additionally, adding ingredients such as texturizers increase the rate the food can be consumed. Fructose ingestion blunts leptin, the satiety hormone, and this activates reward centers and causes feelings of hunger, paralleling what occurs after high amounts of alcohol ingestion. Moreover, components such as high-fructose corn syrup are often combined with other ingredients such as fat, salt, or other sweeteners, contributing to the desirability of these foods. This is similar to the process of cigarette production, in which additional ingredients besides nicotine are added to enhance the aroma, flavor, absorption, and shelf-life. There are some researchers who argue that these hyper-palatable, or ultra-processed foods, should be instead called food-like products because of their high levels of chemicals, flavor additives, and lab-derived compounds.

Research into the ways in which different macronutrients and food additives can be addictive are continually emerging. Refined carbohydrates, which include refined flours and sugar, cause a larger amount of postprandial glucose release, and this causes a short spike followed by a drop in blood glucose below the fasted level, or hypoglycemia. Hypoglycemia can cause greater activation in the reward-related regions of the brain, which can motivate cravings. Further, these foods cause a significant insulin release, which leads to absorption of tryptophan, a precursor to serotonin. Fat plays an important role in texture, flavor, and taste. Fat can enhance mouthfeel and palatability, which has important implications for the enjoyability of hyperpalatable foods. Fat has also shown to cause binge consumption and increased motivation to obtain foods in studies on rats. However, abstinence from fat does not appear to cause withdrawal symptoms in studies on rat the way that abstinence from sugar does. The current research suggests that the combination of refined carbs and fat is what makes addictive-like eating possible. It is hypothesized that one specific ingredient may be what drives the problematic eating, but the combination of multiple ingredients causes the addictive potential. Examples of these foods would be potato chips, pizza, cheeseburgers, French fries, ice cream, and baked goods. Other potential addictive components are salt, which is often paired with foods high in
fat and refined carbohydrates\textsuperscript{27}, and artificial sweeteners, which may cause a partial activation of reward regions, driving the motivation to consume more.\textsuperscript{27}

There is evidence of the neurological similarities between those who are obese and those who have substance use disorder. Genetically, individuals who chronically overeat and individuals who are addicted to substances have variants in the genes encoding the dopamine D2 receptor allele of the ANKKI gene and transporter and opioid receptor genes.\textsuperscript{46} The regions of the brain that are involved in emotional responses compose the limbic system.\textsuperscript{31} This includes the hippocampus, hypothalamus, amygdala, nucleus accumbens (ventral striatum), and prefrontal cortex.\textsuperscript{31} The hypothalamus is responsive to signals that regulate food intake, and if these signals deviate, delayed feelings of satiety can occur.\textsuperscript{21} Excessive overeating occurs when the hypothalamus is overridden by strong hedonic stimuli, which could be hyperpalatable foods, a social situation, or some other type of environmental cue.\textsuperscript{41} The same pattern can be seen with individuals who abuse substances being stimulated by an outside source.\textsuperscript{31}

Most of the focus on neurological similarities is in the response to reward.\textsuperscript{31} It is thought that individuals who overeat or who abuse substances have a reward deficiency syndrome.\textsuperscript{21} However, there is debate that individuals who overeat could have a hypersensitive reward system, which drives their motivation to consume energy-dense foods for pleasure.\textsuperscript{28} When discussing reward in this context, it refers to three concepts: hedonics (liking), reinforcement (learning), and motivation (wanting).\textsuperscript{31} An important distinction to make is that “liking” is the pleasurable feeling resulting from the consumption of the reward, and “wanting” is the desire that will cause a goal-directed behavior or increase motivation to obtain a reward.\textsuperscript{41} Liking is associated with the opioid centers of the brain, and wanting is associated with the dopaminergic pathways.\textsuperscript{41} The shift from liking to wanting occurs after continuous exposure to hyperpalatable foods and is indicate of compulsive behavior.\textsuperscript{41} Most of the focus on the reward cascade is on the endogenous opioid system and the meso-cortico-limbic dopamine pathway from the ventral tegmental area to the nucleus accumbens.\textsuperscript{31,41} The nucleus accumbens is referred to as the pleasure center of the brain and is associated with compulsive behavior, including food intake, and plays a key role in reinforcement.\textsuperscript{41} Research has shown that both illicit drugs and hyperpalatable foods cause the same gratifying effect through the dopaminergic pathway\textsuperscript{31,46} by activating dopamine neurons in the ventral tegmental area, which causes a release of dopamine in the nucleus accumbens.\textsuperscript{46} Further, the amount of dopamine released increases after periods of food deprivation.\textsuperscript{31} Elevated levels of dopamine causes individuals to have increased motivation to engage in rewarding behaviors, in other words, the wanting more than the liking of reward.\textsuperscript{41} Increased consumption of hyperpalatable foods because of this increase in wanting can cause over-stimulation of reward circuitry, leading to hyposensitivity to reward and compulsive eating behaviors.\textsuperscript{23,28,41}

Most of the evidence on the neurological similarities between food and drug addiction has occurred in studies on rats. Example findings from these studies are that rats who consume a diet of processed foods show changes in the mesolimbic dopamine system that parallel drug addiction\textsuperscript{47} and are cross-sensitized to other drugs such as
amphetamines.\textsuperscript{31,47} Further, rats given a high-sugar diet who then have the choice between sugar or cocaine chose sugar, showing the potential that sugar activates the reward system more than cocaine.\textsuperscript{42} More research is needed on the neurological features of food addiction in humans, but studies so far have shown interesting results. Dysfunction in the orbitofrontal cortex is another important component of compulsive behavior and has a significant influence on appetite and eating.\textsuperscript{48} Gearhardt et al conducted a study where women with food addiction were shown an image of a chocolate milkshake and their brain activity was examined using functional magnetic resonance imaging (MRI).\textsuperscript{19} They found that those with food addiction had greater activation in the medial orbitofrontal cortex (responsible for reinforcement), the amygdala (responsible for learned emotional responses), and the anterior cingulate cortex (responsible for motivation to feed). Participants with higher food addiction scores showed less activation in the lateral orbitofrontal cortex compared to those with lower food addiction scores.\textsuperscript{19} Reduced activity in the lateral orbitofrontal cortex implicates a lower amount of dopamine receptors in the striatum, which causes reduced inhibition.\textsuperscript{19,41} Food addiction has also been associated with greater connectivity in the reward systems after periods of fasting, showing that caloric deprivation might increase the likelihood of addictive eating.\textsuperscript{27,49,50} A study by Spring et al\textsuperscript{51} showed that among women who crave carbohydrates, liking increased over time (indicating sensitization), and dysphoria decreased over time (suggesting tolerance), which parallels mood effects from other addictive processes.\textsuperscript{51,52} The neurobiological similarities between drug addiction and food addiction are evident, but some researchers believe that food addiction should be framed as a behavioral addiction.

Food Addiction as a Behavioral Addiction

Evidence that food addiction parallels the behaviors of SUD has accumulated.\textsuperscript{31} The symptoms of continued use in larger amounts and for longer than intended, craving, hazardous use, tolerance, and withdrawal are present in animal models, meeting 5 of the 11 criteria for SUD.\textsuperscript{31} A 2014 review on studies in humans with food addiction found that loss of control, craving, continued use despite negative consequences, and the inability to cut down or stop problematic use are empirically supported.\textsuperscript{9} Some researchers believe food addiction should be referred to as an eating addiction, drawing comparisons to other behavioral addictions, such as gambling (the only behavioral addiction recognized by the DSM-5).\textsuperscript{28,29,53} A behavioral addiction refers to a behavior that is highly rewarding, reinforcing, and alters the reward system, which is similar to drugs of abuse.\textsuperscript{29} The distinction between the two is that the ingestion of a substance is necessary to induce the symptoms of SUD, while for a behavioral addiction, no substance ingestion is necessary.\textsuperscript{29} In summary, those who support the eating addiction construct (behavioral addiction) believe that the potential to be addicted to certain foods relies on cognitive and behavioral factors\textsuperscript{29,30}, while those that support the food addiction construct (substance addiction) believe it is the foods themselves that cause addiction.\textsuperscript{29,54} Proponents of the behavioral addiction framework argue that eating is naturally rewarding and reinforcing, and therefore activates the reward system in the brain by the behavior alone.\textsuperscript{27,30} A 2018 systematic review by Gordon et al suggested that food addiction more closely aligns with the substance addiction perspective, but this could have been due to a lack of evaluation of the characteristics of behavioral
addictions by most quantitative studies. Further, there has been little association between minimally processed foods and addictive-like behaviors. However, some of the common symptoms of food addiction (use despite negative consequences, loss of control over intake) more closely align with the behavioral addiction framework. This debate is ongoing, but there is some evidence that food addiction encapsulates both a substance addiction and behavioral addiction.

**Measuring Food Addiction**

The most widely used tool to measure and diagnose food addiction is the YFAS, which was designed to reflect the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria for SUD. An updated version of this scale, the YFAS 2.0, was created in 2016 to reflect the DSM-V criteria. The YFAS 2.0 contains 35 questions and measures the presence of 12 symptoms, one of which is clinical distress. The YFAS 2.0 can be scored to measure symptom count or using diagnostic criteria. Below is the full scale. Response options to each question are Never, Less than monthly, Once a month, 2-3 times a month, Once a week, 2-3 times a week, 4-6 times a week, or Every day.

**Table 1. Full YFAS 2.0.**

<table>
<thead>
<tr>
<th>Full Yale Food Addiction Scale Version 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>This survey asks about your eating habits in the past year. People sometimes have difficulty controlling how much they eat of certain foods such as:</td>
</tr>
<tr>
<td>- Sweets like ice cream, chocolate, doughnuts, cookies, cake, candy</td>
</tr>
<tr>
<td>- Starches like white bread, rolls, pasta, and rice</td>
</tr>
<tr>
<td>- Salty snacks like chips, pretzels, and crackers</td>
</tr>
<tr>
<td>- Fatty foods like steak, bacon, hamburgers, cheeseburgers, pizza, and French fries</td>
</tr>
<tr>
<td>- Sugary drinks like soda pop, lemonade, sports drinks, and energy drinks</td>
</tr>
<tr>
<td>When the following questions ask about “CERTAIN FOODS” please think of ANY foods or beverages similar to those listed in the food or beverage groups above or ANY OTHER foods you have had difficulty within the past year.</td>
</tr>
<tr>
<td>In the past 12 months….</td>
</tr>
</tbody>
</table>

1. When I started to eat certain foods, I ate much more than planned.
2. I continued to eat certain foods even though I was no longer hungry
3. I ate to the point where I felt physically ill
4. I worried a lot about cutting down on certain types of food, but I ate them anyways.
5. I spent a lot of time feeling sluggish or tired from overeating.
6. I spent a lot of time eating certain foods throughout the day.
7. When certain foods were not available, I went out of my way to get them. For example, I went to the store to get certain foods even though I had other things to eat at home.
8. I ate certain foods so often or in such large amounts that I stopped doing other important things. These things may have been working or spending time with family or friends.
9. I had problems with my family or friends because of how much I overate.
10. I avoided work, school or social activities because I was afraid I would overeat there.

11. When I cut down on or stopped eating certain foods, I felt irritable, nervous or sad.

12. If I had physical symptoms because I hadn’t eaten certain foods, I would eat those foods to feel better.

13. If I had emotional problems because I hadn’t eaten certain foods, I would eat those foods to feel better.

14. When I cut down on or stopped eating certain foods, I had physical symptoms. For example, I had headaches or fatigue.

15. When I cut down or stopped eating certain foods, I had strong cravings for them.

16. My eating behavior caused me a lot of distress.

17. I had significant problems in my life because of food and eating. These may have been problems with my daily routine, work, school, friends, family, or health.

18. I felt so bad about overeating that I didn’t do other important things. These things may have been working or spending time with family or friends.

19. My overeating got in the way of me taking care of my family or doing household chores.

20. I avoided work, school or social functions because I could not eat certain foods there.

21. I avoided social situations because people wouldn’t approve of how much I ate.

22. I kept eating in the same way even though my eating caused emotional problems.

23. I kept eating the same way even though my eating caused physical problems.

24. Eating the same amount of food did not give me as much enjoyment as it used to.

25. I really wanted to cut down on or stop eating certain kinds of foods, but I just couldn’t.

26. I needed to eat more and more to get the feelings I wanted from eating. This included reducing negative emotions like sadness or increasing pleasure.

27. I didn’t do well at work or school because I was eating too much.

28. I kept eating certain foods even though I knew it was physically dangerous. For example, I kept eating sweets even though I had diabetes. Or I kept eating fatty foods despite having heart disease.

29. I had such strong urges to eat certain foods that I couldn’t think of anything else.

30. I had such intense cravings for certain foods that I felt like I had to eat them right away.

31. I tried to cut down on or not eat certain kinds of food, but I wasn’t successful.

32. I tried and failed to cut down on or stop eating certain foods.
33. I was so distracted by eating that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery).

34. I was so distracted by thinking about food that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery).

35. My friends or family were worried about how much I overate.

To score the YFAS 2.0, responses to each question are analyzed to determine if they meet the threshold for each question. For example, some questions need to have responses of “once a week” to meet the threshold, while others need to have responses of “four to six times of week” to meet the threshold. To count symptoms, questions are grouped together, and if the threshold is met for at least one of the groups of questions, the symptom is present. Food addiction diagnoses are determined by tallying the number of symptoms present, and importantly, the clinical significance symptom has to be present to receive a diagnosis. Table 2 illustrates the 12 symptoms and diagnostic criteria measured by the YFAS 2.0.

Table 2. YFAS 2.0 Symptoms and Diagnostic Criteria.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance taken in larger amount and for longer period than intended</td>
<td>#1, #2, #3</td>
</tr>
<tr>
<td>Persistent desire or repeated unsuccessful attempts to quit</td>
<td>#4, #25, #31, #32</td>
</tr>
<tr>
<td>Much time/activity to obtain, use, recover</td>
<td>#5, #6, #7</td>
</tr>
<tr>
<td>Important social, occupation, or recreational activities given up or reduced</td>
<td>#8, #10, #18, #20</td>
</tr>
<tr>
<td>Use continues despite knowledge of adverse consequences (e.g., emotional problems, physical problems)</td>
<td>#22, #23</td>
</tr>
<tr>
<td>Tolerance (marked increase in amount, marked decrease in effect)</td>
<td>#24, #26</td>
</tr>
<tr>
<td>Characteristic withdrawal symptoms; substance taken to relieve withdrawal</td>
<td>#11, #12, #13, #14, #15</td>
</tr>
<tr>
<td>Continued use despite social or interpersonal problems</td>
<td>#9, #21, #35</td>
</tr>
<tr>
<td>Failure to fulfill major role obligation (e.g., work, school, home)</td>
<td>#19, #27</td>
</tr>
<tr>
<td>Use in physically hazardous situations</td>
<td>#28, #33, #34</td>
</tr>
<tr>
<td>Craving, or a strong desire or urge to use</td>
<td>#29, #30</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Criteria</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>No Food Addiction</td>
<td>1 or fewer symptoms OR does not meet criteria for clinical significance</td>
</tr>
<tr>
<td>Mild Food Addiction</td>
<td>2 or 3 symptoms and clinical significance</td>
</tr>
<tr>
<td>Moderate Food Addiction</td>
<td>4 or 5 symptoms and clinical significance</td>
</tr>
<tr>
<td>Severe Food Addiction</td>
<td>6 or more symptoms and clinical significance</td>
</tr>
</tbody>
</table>

**Prevalence of Food Addiction**

Using the YFAS, prevalence of food addiction varies greatly depending on the population being studied. Most investigations have occurred within the clinical population. Holgerson et al state that the prevalence of food addiction in those seeking behavioral weight management is 15-20%, and in those seeking bariatric surgery the prevalence is 14-53%. Pursey et al conducted a review in 2014 and found that the prevalence is higher in those older than 35 years at 22%, and in those younger than 35 the prevalence is 17%. Meule and Gearhardt state in 2014 the prevalence was 5-10% in the non-clinical population, 15-25% in the obese population, and 30-50% in the morbidly obese bariatric surgery population or in obese individuals with binge eating disorder. In 2013, Pedram et al conducted a study in the general population and found an overall 5.4% prevalence, with 6.7% in females and 3.0% in males.

Studies using the YFAS 2.0 have found different prevalence rates than studies above using the YFAS. In 2017, Hauck et al found a 7.9% prevalence in the general population, with the highest prevalence being in the 18 to 29-year-old age group, or young adult age group. Within this age group, prevalence rates have varied. Romero-Blanco et al investigated a sample of university students in 2021 and found a prevalence of 6.9% and Manzoni et al found a 4.3% prevalence in post-graduate students. Other studies on the college-aged population have found a much higher rate, for example, Sengor et al found a 21.1% prevalence, and Jahrami et al found a 20.3% prevalence in females and 17.4% prevalence in males. It is estimated that the prevalence of food addiction in the general US adult population is 15%, which is similar to the prevalence of alcohol and tobacco use.

**Food Addiction Among the Eating Disorder Population**

Food addiction is highest among individuals with binge-type eating disorders, with the highest estimate being 97% among those with bulimia nervosa. However, it may be surprising that there is a high prevalence of food addiction among those with anorexia nervosa, which is characterized by excessive underconsumption. There is a difference among subtypes, with those who are restrictive showing a 47% prevalence, and those who are the binge-purging subtype showing a 74% prevalence. An important finding is that about half of those who exhibit food addictive behaviors do not
have an existing eating disorder but appear to be as clinically impaired as those with an existing eating disorder diagnosis. This shows that food addiction may be capturing a specific phenotype of problematic eating that is not captured by existing diagnostic criteria using the DSM-5 for eating disorders.27

**Characteristics of Food Addiction**

Gearhardt et al examined characteristics of individuals who were obese and had BED and met the criteria for food addiction.56 Participants who had BED completed measures on food addiction, depression, affect, emotion regulation, eating disorder psychopathology, and self-esteem. Of the 81 participants, 46 (57%) met the criteria for food addiction. There were significantly higher levels of depression, negative affect, emotional dysregulation, and eating disorder symptoms, and significantly lower self-esteem than those without food addiction. These findings may indicate that food addiction is a more disturbed variant of eating disorders.56

There have been several examinations into the experience of trauma or PTSD in the clinical food addiction population due to the strong relationship seen between ACEs and adulthood obesity.10 Holgerson et al aimed to examine the relationship between ACEs and food addiction and understand the impact of these two constructs on bariatric surgery completion and success.11 They recruited a sample of 1,586 bariatric surgery-seeking individuals who completed measures on ACEs and food addiction using the YFAS. They found that 19.2% and 22.1% of the sample were victims of childhood sexual and physical abuse, respectively. A higher ACE score showed a significantly increased likelihood of being diagnoses with food addiction. They also classified participants into two groups: those who screened positive for ACEs or for food addiction and those who screened negative for both. They found that those who screened positive were significantly less likely to undergo bariatric surgery. Further, among those who did elect to have surgery, those with food addiction had significantly less total weight loss post 1-year surgery. These findings show the impact ACEs may have on food addiction and how both food addiction and ACEs can limit successful bariatric surgery outcomes.11

Mason et al investigated the relationship between child abuse victimization and food addiction in adult women using data from 49,408 NHANES II participants aged 25 to 43 years old.16 They found that 8% of participants reported severe physical childhood abuse and 5.3% reported severe childhood sexual abuse, and 8% met the criteria for food addiction. Those who had food addiction were 6 units of BMI heavier than those without, and severe physical and severe sexual abuse were association with a 90% increase in food addiction risk. They then expanded on this study and investigated the experience of PTSD symptoms and their relationship with food addiction in women using the same dataset and examined their lifetime trauma exposure, PTSD symptoms, and food addiction.18 They found that 80% reported some type of trauma exposure, and 66% of those with trauma exposure reporting at least one lifetime PTSD symptom. They found that prevalence of food addiction increased with the number of lifetime PTSD symptoms, and those with 6 to 7 PTSD symptoms had more than twice the prevalence of food addiction compared to those with no PTSD or trauma. They did not see significant variations in food addiction by trauma type.18 Imperatori et al recruited 301
overweight/obese women seeking diet therapy in an obesity clinic in Italy to investigate the association between childhood trauma and food addiction. They completed measures on food addiction, childhood trauma, binge eating, and anxiety or depression symptoms. They found a significant positive association between childhood trauma and both food addiction and binge eating severity. After controlling for confounding variables, food addiction and childhood trauma still had a significant relationship. The co-occurrence of food addiction and binge eating was associated with more severe childhood trauma, more severe anxiety/depression, and higher BMI compared to those without any dysfunctional eating patterns. These findings implicate that addressing trauma may be a potential solution when treating patients with food addiction or binge eating.

Hardy et al investigated the similarities between women with food addiction and women with SUD due to previous investigations examining these two populations separately. They recruited 229 participants in a low socioeconomic region to complete measures on food addiction, emotional eating, trauma, depression, PTSD, and emotion regulation. Of the 229 participants, 42 had food addiction but not SUD, 70 had SUD but not food addiction, and 117 had neither. They found that participants with food addiction and participants with SUD had higher total emotion dysregulation scores, specifically in goal-directed behaviors, non-acceptance of emotional responses, impulse control, and lack of emotional clarity compared to the participants with neither food addiction nor SUD. They did not find significant differences in PTSD and depression between groups, but women with SUD had higher levels of trauma compared to those with food addiction and those with no addiction. Another investigation into the general population by Hauck et al investigated the prevalence of food addiction in German adults aged 18 to 65 years old. Other variables included BMI, sex, education level, and place of residence. Among the 1,304 participants, there was a 7.9% prevalence of food addiction and those who had food addiction had a significantly higher BMI and were younger than those who did not meet food addiction criteria. The highest prevalence of food addiction was in the underweight (15.0%) and obese (17.2%) categories. There were no significant associations between sex, education level, or place of residence. These findings show that although food addiction can contribute to overeating and subsequent weight gain, it can also occur in those who are not obese and needs more investigation into this phenotype.

Individuals with food addiction consistently show to have comorbid mental health disorders. Burrows et al conducted a systematic review with meta-analysis on the relationships between food addiction as measured by the YFAS and mental health symptoms. They found that most studies on food addiction were conducted in the adult population (> 18 years), mostly in females, and were cross-sectional. Most studies were conducted in individuals seeking weight-loss treatment or bariatric weight-loss groups. There was an overall 16.2% prevalence of food addiction across the studies, with women and girls having a higher prevalence than men. The most common mental health conditions were disordered eating (with binge eating being the most common), depression, anxiety, and PTSD. They found a weighted mean correlation of 0.602 between food addiction and disordered eating, a weighted mean correlation of 0.459 for the relationship between food addiction and depression, and for the relationship
between food addiction and anxiety, the weighted mean correlation was 0.483. There was no relationship found between food addiction and alcohol or drug use. These findings show a positive, moderate association between food addiction and depression/anxiety. Further, it shows that given the moderate associations, there is more to the construct of food addiction that is not captured by depression, disordered eating, or anxiety.64

There have been recent investigations into the experience of food addiction in the college-attending population. Romero-Blanco et al analyzed food addiction in a group of university nursing students in Spain and their health habits, BMI, and health status.8 Participants (n=536) completed measures on diet, physical activity, sleep quality, quality of life (including anxiety/depression), smoking, and alcohol consumption. There was a 10.3% prevalence of overweight/obesity and 6.4% prevalence of food addiction. There was significantly worse sleep quality and anxiety/depression and higher BMI and sedentary lifestyles among those with food addiction compared to those without. Being overweight/obese was the strongest predictor of food addiction, followed by anxiety/depression, sleep, and sedentary lifestyles. These findings show the lifestyle habits of college students with food addiction and identify potential behavioral intervention targets.8 Another study by Sengor et al aimed to examine the relationship between food addiction, eating disorder symptoms, and obesity in college-attending young adults in Turkey.59 They measured food addiction, BMI, and eating attitudes in 370 students and found a 21.1% prevalence of food addiction. There was a positive weak relationship between food addiction scores and both body weight and BMI as well as between food addiction and eating disorder symptoms. They also found a higher prevalence of food addiction in females than males. The authors conclude that food addiction can trigger eating disorders or vice versa.59

Meule et al examined differences in prevalence of food addiction among German college students and its associated characteristics.35 They found a 10% prevalence of food addiction across the entire sample and it was significantly associated with higher BMI, binge eating frequency, food cravings, impulsivity, and lower self-perceived dietary control. When examining specifically the obese population in this sample, there was a 47% prevalence of food addiction, and it was again associated with higher binge eating frequency and impulsivity. However, there were no significant differences in BMI between those with food addiction and without. Jahrami et al investigated the associations of nomophobia (no-mobile-phobia, or the fear or worry at being without your phone or unable to use it) and insomnia and food addiction in a sample of college students in Bahrain.60 Among the 654 participants, there was a 20.3% prevalence of food addiction in females and a 17.4% prevalence in males, but there was no significant association between food addiction and nomophobia or insomnia.60

**Diet Quality and Eating Behaviors**

There have been few investigations into the diet quality or eating behaviors of individuals with food addiction. Pursey et al aimed to evaluate if intakes of specific foods are associated with food addiction in young adults.66 They used an online survey to measures 462 adults aged 18 to 35 years in Australia on their food addiction and usual dietary intake. They found a 14.7% prevalence of food addiction, with a higher
proportion of females than males. There were significant associations between higher food addiction scores and higher percent energy intake from calorically dense foods including candy, take out and baked goods, and lower percent energy intake from nutrient-dense foods including whole grains and cereals. These findings show preliminary evidence of differences in dietary quality between those with and without food addiction, but effect sizes were small and could limit clinical applications. Ayaz et al conducted a study that investigated differences in eating patterns or abnormal eating behaviors between those with food addiction and without. Using a sample of 851 adults aged 19 to 65 years in Turkey, they measured demographic information, 24-hour dietary recalls, food addiction, eating disorder symptoms, and anthropometric measurements. They found an 11.4% prevalence of food addiction, with a higher rate in females. Among those who had food addiction, 35.1% were obese, and 3.1% were underweight, and this was significantly different than those without food addiction. There was a 40.2% prevalence of abnormal eating attitudes among those with food addiction, and a significantly higher total daily energy, protein, and fat intake in females in food addiction compared to females without. These findings add support to the differences in dietary quality and eating behaviors in individuals with food addiction.

### Qualitative Studies on Food Addiction

Within the published literature, there have been few qualitative investigations into the food addicted population. Malika et al recruited low-income women with preschool-aged children to participate in focus groups or interviews that gathered insight into their perceptions of food craving versus food addiction. Constant comparative thematic analysis of the responses from 61 participants generated five themes. The first theme was food craving is a strong want or desire for food and is an acceptable behavior. Participants felt that food craving is normal and not something to be concerned over. The second theme was food addiction exists and is characterized by specific behavioral features, in which participants described behaviors such as feeling a compulsive need to always have food nearby. The third theme was food cravings and food addictions are similar in that food addiction is an uncontrolled food craving and food cravings are more common and less severe than food addiction. Participants described that food addiction is different because it is addiction to highly processed foods high in sugar and/or fat, but cravings can be for any type of food. The fourth theme was that participants described food cravings in a humorous manner but food addiction was described more seriously. The final theme was that it’s common for children to have food cravings, but they can only become addicted to foods if their parents “let” them. These findings have important contributions to the understanding of how food addiction is perceived to be different from other eating behaviors, as well as how individuals believe in the importance of parental influence on eating behavior.

Ruddock et al recruited a university sample of staff and students to complete a questionnaire on food addiction and its causes. Of their sample of 210, 28% identified as food addicts. Thematic analysis on perceptions of food addiction yielded six themes: reward-driven eating, functional or psychological preoccupation with food, a perceived lack of self-control around food, frequent food cravings, increased weight or an unhealthy diet, and problem with a specific type of food. The themes did not differ
between the self-perceived food addictions and non-addicts. These findings show the perceived behavioral characteristics of food addiction. Paterson et al also recruited from a university sample to explore the conceptualizations of addictive-like eating by self-proclaimed food or eating addicts. Thematic analysis of responses from 10 participants generated four themes. The first was social environment, in which participants described their current social environment, such as close social circles, or past social environments, such as familial eating behaviors and diet culture, having a negative effect on their eating behaviors. The second theme was situational cues, where participants described situations such as being sedentary or returning home at the end of the day being situational triggers to their eating. The third theme was persistent cognitions, entailing participant descriptions of mental preoccupations with food, loss of control, and awareness of negative consequences. The final theme was impact of weight, where participants described the negative effects of their eating behavior on their weight, health, body-image, and distress. Results from this study describe the causes, characteristics, and consequences of food or eating addiction, which has important implications for the conceptualization of this phenomenon.

Lacroix et al completed interviews with women and men seeking treatment for addictive-like eating in Brazil to explore the experiences and conceptualization of their eating behaviors. The 15 participants in their study were recruited from a food addiction treatment program. The questions covered overarching topics of personal experience, conceptualization, distress and impairment, and coping. The participants described emotional eating, the ubiquity of food, situational factors, and social factors being causes of addictive-like eating. They described this behavior to have characteristics of attempts to reduce, lack of control, parallels to drugs, and preoccupation. Participants stated that addictive-like eating has consequences of shame/secrecy, weight gain, health problems, and social and professional impairment. Results of this study add to the understanding of the behaviors of individuals with addictive-like eating as well as validity to the daily interferences caused by this issue, similar to drug addiction. Cullen et al recruited 23 individuals from an obesity clinic with a BMI > 25 to explore differences in how they view the concept of food addiction across a range of weight ranges. Participants cited causes of overeating and weight gain to be due to a variety of reasons, including familial influence, emotional factors, and socioeconomical factors. Lack of control was commonly expressed as a characteristic of food addiction. Many of the participants supported the plausibility and validity of the food addiction construct and felt it was consistent with their own eating behaviors. Some participants felt that being diagnosed with food addiction could have a negative impact on self-stigma, while others felt it helped to put a name to it. Most participants felt that widespread acceptance of the concept of food addiction would improve treatment effectiveness. They had skepticism on the effectiveness of policy regulations but felt that strategies such as lowering the cost of healthy food and providing children with education on how to cook and eat healthily would be effective. These results provide important understanding on how food addiction is perceived by overweight/obese individuals and whether treatment or prevention is possible from their perspective.

Van Ostrand completed interviews with women recruited from the local community in order to explore their experiences with food addiction. The six
participants were diagnosed with food addiction using the YFAS. Using interpretative phenomenological analysis, five themes emerged. The first theme was loss of control over food intake, where participants expressed feelings of shame and stress from not being able to control food intake. The second theme was the need for external control for successful weight loss, in which participants described being successful with diets when they had supervision but falling back to old habits once they achieved a goal weight or breaking a diet. The third theme was the presence of emotional eating, where participants described eating in response to any negative emotion and using it to cope. The fourth theme was experience and knowledge of food addiction and advice to others. Participants described that a lot of support and help is needed in order to combat food addiction. The final theme was food and eating cause significant distress. Participants expressed avoiding social situations and having a negative self-image that interfered with their daily life. These findings again show the distress and impairment caused by food addiction as well as its characteristic behaviors.

Risk Factors for Development of Food Addiction

Everyone has to consume food to survive, but not everyone develops a food addiction. This parallels addictive drugs, as not everyone who consumes an addictive drug develops a substance use disorder. For example, 90% of people consume alcohol over their lifetime, but 14% develop an alcohol-use disorder.27 The risk factors for developing a food addiction are similar to the risk factors for developing a drug addiction.27 These risk factors include the addictive potential of a substance, and in the case of food, ultra-processed foods are shown to have additive potential.27 Individual risk factors include a family history of addiction, lack of control, impulsivity, trauma exposure, and depression.27 Environmental risk factors include low cost of these foods, high availability, and frequent marketing.27 Further, interpersonal factors such as social acceptance highly influence an individual’s eating behaviors.27 The perspective on an individual’s risk of developing an addiction is that individual risk factors interact with the addictive potential of a substance to result in pathology.9,27

College-Attending Young Adults

College-attending young adults are at a formative life stage, which is characterized by irregular lifestyles59, and the emergence of mental health disorders.72,73 They are heavily influenced by the food environment8, and college campuses often have widespread availability of hyperpalatable foods8. Further, their unique personal and social environment can influence their eating behaviors.74 College students often have unhealthy eating habits69 and develop negative coping mechanisms, such as use of drugs or alcohol, to combat stress.36,75 With the aforementioned risk factors for the development of food addiction, college students may be at high risk for developing this disorder. Investigations into the college population thus far have found high rates of food addiction59,60 and its presence across multiple BMI categories.35 Findings so far show that food addiction is a significant issue on college campuses, but more investigation is needed into the causes and characteristics of this disorder.

Conclusion
This summation of literature on food addiction described what is currently known about the prevalence and characteristics of food addiction in various populations. Most of the studies on food addiction in the college-attending young adult population have occurred outside of the US, where food environments likely differ. Due to the influence of the food environment on an individual’s eating behaviors, investigations into the US college-attending population is needed. Individuals who reside in certain regions within the US may be at a higher risk of developing food addiction due to their unique characteristics. Appalachia, a region that spreads over 13 states in the southern and northeastern regions of the US, is traditionally plagued by health disparities with low access to healthy food, reliance on cheap and processed foods, and higher rates of addiction and chronic disease than other regions in the US. Given the characteristics of the Appalachian region and the risk factors present in the college environment, investigations into the prevalence of food addiction, as well as its causes and characteristics, are needed in the college-attending young adult population in Appalachia. Understanding this can contribute to further conceptualizing this phenomenon and begin to work toward potential treatments.
Chapter III: Research Design and Statistical Analyses
Introduction

This chapter will describe the research methodology used to address research questions for this investigation of psychosocial and behavioral characteristics of food addiction among college-attending young adults in Appalachia. A brief description of data collection methods will be described here along with associated hypotheses and will be described in further detail in subsequent chapters within each study. Study design, data gathering, instruments and variables measured, and data analyses will be explained. As both quantitative and qualitative approaches were utilized for both Aims 1 and 2, these approaches will be described separately. This mixed-methods approach utilizes a sequential explanatory design, in which quantitative data is collected first, analyzed, and then used to collect qualitative data to contribute to explanation of findings from the quantitative study.80

Sample and Data Collection

Quantitative

Cross-sectional, online survey data collection was utilized. Surveys were distributed to students attending a university in the Appalachian region in fall 2021. The only inclusion criteria were being at least 18 years of age and currently enrolled at the university. Convenience sampling was used, and students were recruited through emails containing a link to Qualtrics, an online survey platform. Informed consent was completed online by all students and was required in order to proceed to the survey. Participants had the option to provide their contact information in order to enter a drawing to receive one of three $100 gift cards as incentive. This study was approved by West Virginia University Institutional Review Board (#2106344268).

Qualitative

At the conclusion of the survey, participants were informed that the primary outcome of this study was food addiction and given the option to be contacted for an interview if they meet the criteria for food addiction. Responses from the survey were analyzed to place participants into categories of no, mild, moderate, and severe food addiction. Individuals who had mild, moderate, or severe food addiction and who also agreed to be contacted for an interview were emailed an invitation to participate in the interview. All interviews were conducted virtually via Zoom and audio recorded for transcription purposes. Participants had to complete an additional consent form prior to completing the interview. This study was approved by West Virginia University Institutional Review Board (#2106344268).

Measures

Quantitative

The full survey was developed by the Lifestyle Intervention Research Lab and includes validated tools that measure a breadth of psychosocial and behavioral characteristics as well as demographic variables. The primary variable of interest, food
addiction, was measured using the Yale Food Addiction Scale 2.0 (YFAS 2.0). Details of the measures used are as follows:

**Yale Food Addiction Scale Version 2.0**: This 35-item tool was created by Gearhardt et al in order to update their original version to accurately reflect the Diagnostic and Statistical Manual of Mental Disorders Version 5 (DSM-5) for substance use disorder criteria. This scale measures the frequency of occurrence of 35 behaviors related to eating habits in the past year, such as “I spent a lot of time eating certain foods throughout the day”, “My eating behavior caused me a lot of distress”, and “I avoided work, school, or social functions because I could not eat certain foods there”.

Responses to these items are then used to measure the experience of 12 different symptoms such as persistent desire or repeated unsuccessful attempts to quit, much time/activity to obtain, use, recover, and continued use despite social or interpersonal problems. Researchers can score the scale using a symptom count in a continuous manner or by categorizing respondents using diagnostic criteria. To be diagnosed with food addiction, clinically significant impairment or distress must be present. The number of symptoms is added to diagnose individuals with the following:

- No Food Addiction = 1 or fewer symptoms OR does not meet criteria for clinical significance
- Mild Food Addiction = 2 or 3 symptoms and clinical significance
- Moderate Food Addiction = 4 or 5 symptoms and clinical significance
- Severe Food Addiction = 6 or more symptoms and clinical significance

**Adverse Childhood Experiences (ACE) Questionnaire**: This 10-item tool asks respondents about their experience of traumatic events during their first 18 years of life. This includes physical, sexual, and emotional abuse as well as household dysfunction. Questions include “Did a parent or other adult in the household often swear at you, insult you, put you down, or hamstring you? OR act in a way that made you afraid you might be physically hurt?” and “Did you often feel that no one in your family loved you or thought you were important or special? OR that your family didn’t look out for each other, feel close to each other, or support each other?”. Respondents indicate “Yes” or “No” if the experience happened to them, with affirmative responses being scored as 1. Scores are summed for a possible score of 0 to 10, with higher scores indicating more ACEs and higher risk for development of behavioral health disorders. Scores can be analyzed continuously or by categorizing individuals into high or low ACEs, with 4 or more ACEs being considered high.

**Patient Health Questionnaire-9 Item (PHQ-9)**: This 9-item tool asks respondents questions on their experience of depression symptoms over the prior 2 weeks. Symptoms include “feeling tired or having little energy”, “little interest or pleasure in doing things”, and “trouble concentrating on things, such as reading the newspaper or watching television” with response options of “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed and scored from 0 to 27 or categorized into minimal, mild, moderate, moderately severe, and severe depression.
**Generalized Anxiety Disorder-7 Item (GAD-7):** This 7-item tool asks respondents questions on their experience of anxiety symptoms over the prior 2 weeks. Symptoms include items such as “feeling nervous, anxious, or on edge”, “trouble relaxing”, and “becoming easily annoyed or irritable”. Response options include “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed for a total of 0 to 21 or categorized into minimal, mild, moderate, and severe anxiety.

**Eating Disorder Examination Questionnaire-Short Form (EDE-QS):** This scale contains 12 items that measure the presence of eating disorder symptoms over the previous 7 days. Responses are summed and scored from 0 to 36, with higher scores indicating presence of more symptoms. A cut-off of 15 can be used to indicate clinically significant eating disorder symptoms.

**Cohen’s Perceived Stress Scale-10 Item (PSS-10):** This scale contains 10 items on perceived stress over the past month. Items include questions such as “How often have you been upset because of something that happened unexpectedly?” and “How often do you feel that you could not cope with all the things that you had to do?” with response options of “Never”, “Almost never”, “Sometimes”, “Fairly often”, and “Very often”. Scores are summed for a total of 0 to 40 or categorized into low, moderate, and high perceived stress.

**Three Factor Eating Questionnaire (TFEQ):** This 18-item tool measures eating behavior. Items include statements such as “When I feel anxious, I find myself eating”, “Sometimes when I start eating, I just can’t seem to stop”, and “I do not eat some foods because they make me fat” with response options of “Definitely true”, “Mostly true”, “Mostly false”, and “Definitely false”. Responses are broken down into subscales of cognitive restraint, emotional eating, and uncontrolled eating (disinhibition).

**Short Healthy Eating Index (sHEI):** This tool measures diet quality and is a convenient tool due to it being a shorter method than traditional tools that assess dietary intake. It contains 22 questions on the frequency of consumption of various food groups and scores are computed to reflect the total average intake of each food group.

**Anticipated Effects of Food Scale (AEFS):** This scale contains 2 questions that measure 31 emotions on anticipated feelings after intake of healthy or junk food. The scale asks respondents to indicate the likelihood (such as definitely not, probably, or definitely) that they will experience feelings such as shame, happiness, frustration, deprivation, or worry after eating junk food following by the same question and anticipated feelings for healthy food.

**Difficulties in Emotion Dysregulation Scale-Short Form (DERS-SF):** This scale contains 18 items that measure emotion regulation. Respondents indicate how often statements such as “I pay attention to how I feel”, “When I’m upset, I become out of control”, or “When I’m upset, it takes me a long time to feel better” apply to them. It contains subscales of non-acceptance, impulse, goals, awareness, and clarity. Higher scores in each subscale indicate more difficulty with that specific emotion regulation strategy.
Primary Care PTSD Screen for DSM-5 (PC-PTSD-5): This scale contains 5 questions related to the experience of PTSD symptoms over the past month. Symptoms include “constantly on guard, watchful, or easily startled” and “feeling guilty or unable to stop blaming yourself or others for the events or any problems the event may have caused” with response options of “Yes” or “No”. Affirmative responses are scored as 1 and summed. A score of 3 or more indicates PTSD.

Oslo Social Support Scale-3 Item (OSSS-3): This 3-item scale measures respondents perceived social support with statements such as “How many people are so close to you that you can count on them if you have great personal problems?”. Scores can be summed in a continuous manner with higher scores indicating higher social support, or categorized into poor, moderate, and strong social support.

Brief COPE: This 28-item tool measures different coping strategies such as “I’ve been giving up trying to deal with it” and “I’ve been getting comfort and understanding from someone”. Respondents indicate how often they have been using each style, with options of “I haven’t been doing this at all”, “A little bit”, “A medium amount”, and “I’ve been doing this a lot”. Responses are summed with higher scores indicating more frequent use of each of the 14 subscales. The most common scoring method is use of the 3 overarching coping styles of problem-focused coping, emotion-focused coping, and avoidant coping.

Ten-Item Personality Inventory (TIPI): This scale contains 10 questions that measure the Big 5 personality traits: extraversion, conscientiousness, openness to experiences, agreeableness, and emotional stability. Statements include “I see myself as extraverted, enthusiastic” or “I see myself as disorganized, careless” with responses ranging on a 7-point scale from disagree strongly to agree strongly. Higher scores in each subscale indicate a more significant presence of each trait.

Alcohol Use Disorder Identification Test (AUDIT-C): This scale contains 3 questions on the frequency and amount of alcohol use. Respondents indicate how often they have drinks containing alcohol, how many drinks they have on a typical day of drinking alcohol, and how often they have more than 6 drinks in one occasion. Higher scores indicate more problematic drinking or a cut-off of 3 for women and 4 for men indicates problem alcohol use.

Drug Abuse Screening Test-10 Item (DAST-10): This scale contains 10 questions related to use and frequency of substance use such as “Have you used drugs other than those required for medical reasons?” and “Have you engaged in illegal activities in order to obtain drugs?”. Response options are “Yes” or “No”, with affirmative responses being scored as 1 and summed. Higher scores indicate more problematic substance use or scores can be categorized into no problems, low level, moderate level, substantial level, and severe level of substance problems.

Demographic Variables: Demographic variables included sex, gender identity, race/ethnicity, age, year in school, height, and weight. Height and weight were used to compute participant body mass index (BMI).
Qualitative Interviews

A preliminary list of qualitative questions was drafted before collection of quantitative data. The questions were modified based off of quantitative data analysis that informed areas that needed further explanation. The final interview script contained 13 questions with 9 probes, with the option for additional questions to be asked based off of each interview. The questions covered 9 overarching topics of Perceptions of Food Addiction, Early Life Influences, Emergence of Symptoms, Experience of Symptoms, Current Eating Behaviors, Feelings About Eating Behavior, Desired Relationship with Food, Interactions with Health Professionals, and Potential Solutions.

Analyses

Aim 1

Aim 1 was to determine the impact of Adverse Childhood Experiences and other early life experiences on the development of food addiction in college-attending young adults.

Quantitative

Quantitative measures will examine the impact of ACEs on food addiction. The aim 1 hypothesis was that more ACEs would lead to the development of food addiction. Descriptive statistics were computed for demographic variables, food addiction (outcome variable), ACEs (predictor variable), depression, anxiety, stress, and PTSD (confounding variables). Food addiction diagnoses were grouped into a binary variable (no food addiction = 0, mild, moderate, or severe food addiction = 1) and all other variables were ran continuously. Simple logistic fit was used to determine bivariate relationships between food addiction and continuous variables and Chi-square was used to determine relationships between food addiction and categorical variables. Significant variables from this bivariate analysis were placed into a full logistic regression model. Significance criterion alpha for all tests was 0.05. All analyses were conducted using JMP Pro Version 16.0.

Qualitative

Thematic analysis was used to analyze qualitative data using NVIVO Software Version 12.0. Data was organized by topic and coding occurred within each topic. Codes were then used to generate themes and subthemes. Codes, themes, and subthemes were reviewed multiple times. A second researcher reviewed all themes to make sure both reliability and validity of results occurred. In order to elucidate other potential early life influences on the development of food addiction besides ACEs, responses to the questions under the topic of “Early Life Influences” and “Emergence of Symptoms” were thematically analyzed.

Aim 2

Quantitative
Aim 2 was to determine the psychosocial and behavioral characteristics of college-attending young adults with food addiction. The aim 2 hypothesis was that individuals with food addiction will display significant differences in their psychosocial and behavioral characteristics (such as depression, anxiety, coping styles, and emotion regulation) than individuals without food addiction. Descriptive statistics were computed for all variables. Differences between participants with and without food addiction in mean scores of depression, anxiety, stress, PTSD, eating disorders, emotion dysregulation, coping styles, personality type, drug use, alcohol use, social support, eating styles, anticipated effects of food, and diet quality were analyzed using Kruskal Wallis \( H \). Steel with control was used to test for differences in means between mild, moderate, or severe food addiction compared to no food addiction. All analyses were conducted using JMP Pro Version 16.0.

Qualitative

Thematic analysis was used to analyze qualitative data using NVIVO Software Version 12.0. Data was organized by topic and coding occurred within each topic. Codes were then used to generate themes and subthemes. Codes, themes, and subthemes were reviewed multiple times. A second researcher reviewed all themes to make sure both reliability and validity of results occurred. In order to further understanding from Aim 2 quantitative findings on psychosocial and behavioral characteristics of young adults with food addiction, the topics of Perceptions of Food Addiction, Early Life Influences, Emergence of Symptoms, Experience of Symptoms, Current Eating Behaviors, Feelings About Eating Behavior, Desired Relationship with Food, Interactions with Health Professionals, and Potential Solutions

Limitations of the Study

The use of a cross-sectional study design for Aim 1 and 2 allowed for cost-efficient and timely data collection of many variables to create a comprehensive understanding of food addiction among college-attending young adults. Further, qualitatively investigating this topic contributes to a deeper understanding of food addiction that is needed in the field. However, this methodology is not without limitations. Although the sample size used in this study were sufficient for analysis, respondents are not representative of all college students and should not be generalized as such. Causation is not able to be inferred, and therefore this research highlights a relationship between food addiction and many other variables with no inference of cause or effect. Qualitative data is limited by gathering perceptions and experiences from students at one university and again should not be generalized as representative of all college-attending young adults with food addiction. Further limitations of the overall studies will be described in Chapter 7.
Chapter IV: Adverse Childhood Experiences and Early Life Influences on the Development of Food Addiction in College-Attending Young Adults
ABSTRACT

Background: Food addiction is an emerging area of obesity and health research that has shown similarities to drug addiction. A significant contributing factor to the development of drug addiction is the experience of Adverse Childhood Experiences (ACEs). There is little investigation into the causes of food addiction. The aim of this study was to determine the impact of ACEs and other childhood influences on the development of food addiction in college-attending young adults aged 18-29.

Methods: This study utilized a sequential explanatory mixed-methods research design. College-attending young adults were invited to complete an online survey measuring ACEs, food addiction, depression, anxiety, stress, and demographic information. Correlations between food addiction and the other variables were analyzed using Pearson’s $r$ and significant variables were placed into a nominal logistic regression model to predict the development of food addiction. Participants who met the criteria for food addiction were invited to participate in interviews to examine their childhood eating environment and when their symptoms emerged. Interviews were transcribed and thematically analyzed. Quantitative analysis was conducted using JMP Pro Version 16.0 and qualitative analysis was conducted using NVIVO Software Version 12.0.

Results: Survey respondents (n=1645) had an overall 21.9% prevalence of food addiction, with 5.7% of that being mild, 4.7% being moderate, and 11.5% being severe. Simple logistic fit showed significant correlations between food addiction and ACEs, depression, anxiety, and stress, and Chi-square showed significance between food addiction and sex ($p<.01$ for all). Depression was the only significant predictor of the development of food addiction ($OR = 3.33$ 95% CI 2.19, 5.05), with being female trending towards significance ($p = .06$). Interview participants (n=36) described various eating environments growing up, with the most common being an emphasis on diet culture, ideal body image, and restrictive environments. Symptoms frequently emerged after transitioning into college and having the ability to make their own food choices, with other contributing factors being triggering events or worsening mental health.

Conclusion: These results show that ACEs were not a significant predictor of food addiction, but depression was. Qualitative results show that restrictive eating environments led to the development of food addiction in many participants, and that symptoms emerged once individuals had newfound freedom to make food choices in college, as well as during times of increased stress or worsening mental health. These findings contribute to the understanding of underlying causes of food addiction.
Introduction

Within the United States, approximately 42.4% of individuals are overweight or obese\(^1\). Despite decades of research on treating obesity, little progress has been made on reducing its prevalence\(^2\). Obesity is a health problem of concern as it increases an individual’s risk of developing type 2 diabetes, coronary heart disease, end-stage renal disease, and facing psychosocial complications such as weight-related stigma\(^1,3\). The focal cause of obesity has been an excess intake of calories through overeating, but more recently the focus has been on biological and environmental factors, or psychosocial factors\(^2\). Today’s food environment is characterized by the widespread prevalence of highly-palatable foods\(^7\), such as foods with added sugars or highly processed or refined foods, and an increase in the consumption of foods for pleasure rather than sustenance\(^8\). These societal trends co-occurring with the rise in obesity has led to the examination of the potential addictive properties of food, or the study of food addiction.

Food addiction can be defined as “a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high please, energy, or excitement, or to relieve negative emotional or physical states”\(^5\). Food addiction has shown multiple neurological similarities to drug addiction. Individuals with food addiction display high activation of reward systems when anticipating intake of highly palatable foods. Illicit drugs and food have been shown to cause the same feelings of gratification through activation of the dopamine neurons in the ventral tegmental area followed by release of dopamine in the nucleus accumbens\(^4,6\). There are genetic similarities as well, including variants in the genes encoding the dopamine D2 receptor allele of the ANKKI gene and transporter and opioid receptor genes\(^4,6\). Emotionally, there are similarities between populations with substance use disorder (SUD) and food addiction, including a lack of emotional clarity, poor impulse control, higher emotional dysregulation, and higher non-acceptance of emotional responses\(^2,5\).

Within examination of psychosocial causes of obesity, there is a strong body of evidence on Adverse Childhood Experiences (ACEs) leading to adulthood obesity\(^10-14\). From this research, it has been shown that individuals with ACEs can develop mal-adaptive coping strategies to stress and other negative emotions, including overeating\(^13,17\). ACEs can disrupt an individual’s chronic stress response by altering the function of the hypothalamic-pituitary-adrenal (HPA) axis, leaving these individuals more vulnerable to high stress and subsequently higher risk for negative coping mechanisms\(^10\). ACEs have also been shown to lead to adulthood SUD\(^2,8\). There are similarities between the populations with SUD and obesity, including reduced sensitivity to reward\(^16,21\), which can lead to addictive behavior\(^14\). The growth in food addiction research rapidly increased in 2009 after Gearhardt et al developed the Yale Food Addiction Scale (YFAS) to diagnose food addiction\(^6\). However, there is still little known about the causes of food addiction. Given the similarities between individuals with food addiction and individuals with SUD, and the link between ACEs and SUD as well as obesity, it is possible that ACEs can lead to the development of food addiction. This relationship has not been well-studied to date. There is evidence of ACEs leading to the
development of eating disorders\textsuperscript{82,83}, but food addiction is a separate construct than other eating disorders such as binge eating disorder, anorexia nervosa, and bulimia\textsuperscript{46} and therefore needs separate investigation. Overall, most research on food addiction has focused on the clinical population, such as bariatric surgery candidates\textsuperscript{11,22} and individuals with eating disorders\textsuperscript{56}, and in the population of females over age 35\textsuperscript{3,16}. While this is important, non-clinical investigations are needed in at-risk populations.

College-attending young adults are at a formative period of their lives during which lifelong lifestyle behaviors are established\textsuperscript{36-38}. This time period can be characterized by high stress, weight gain, and the development of behavioral disorders. Young adults are heavily influenced by the food environment\textsuperscript{8} and consistently show unhealthy eating habits\textsuperscript{59}. There is a risk of developing food addiction as a response to stress or to cope with negative emotions. Although there have been several investigations into food addiction among college students\textsuperscript{8,34,35,59}, there is little investigation into possible contributing factors. The aim of this study is to determine the impact of ACEs and other early life experiences on the development of food addiction in college-attending young adults.

Methods

Study Design

This mixed-methods study used a sequential explanatory analysis approach in which quantitative data is collected first, analyzed, and then used to collect qualitative data to contribute to explanation of findings from the quantitative study\textsuperscript{80}. To achieve this, a cross-sectional study was first conducted to examine a sample of young adults aged 18-29 attending a large, Appalachian university in fall 2021. Participants were currently enrolled college students. Following quantitative analysis, participants with food addiction were invited to complete in the qualitative portion of semi-structured open-ended interviews to elucidate other causes or contributing factors to their development of food addiction. All subjects gave their written informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Institutional Review Board at West Virginia University (#2106344268).

Participants and Procedures

A convenience sample of undergraduate and graduate students attending a large, land-grant university in central Appalachia was recruited during the fall 2021 semester. A list of emails of all active and registered students during the fall 2021 semester was obtained and students were emailed an invitation to participate that included a Qualtrics link, an online survey platform (Qualtrics, Provo, UT, USA). Participants were instructed to read the informed consent and if they agreed to participate, they proceeded to complete the survey. Students who denied participation were thanked for their time and exited from the survey. After completing the survey, students were informed that the primary outcome of the study was food addiction and were asked if they would be willing to be contacted again to participate in an interview if they are diagnosed with food addiction based on their responses. If they agreed,
participants provided their email for future contact. Students were incentivized to complete the survey by a chance to win one of three $100 American Express gift cards by entering their contact information following survey completion.

**Quantitative Approach**

**Survey Design**

This 97-item survey was developed by the Lifestyle Intervention Research Lab at WVU using validated tools to investigate a breadth of psychosocial and behavioral characteristics of college-attending young adults. The variables utilized for this study were food addiction using the Yale Food Addiction Scale 2.0 (YFAS 2.0)\(^{57}\), childhood trauma using the Adverse Childhood Experiences (ACE) Questionnaire\(^{84}\), depression using the Patient-Health Questionnaire-9 Item (PHQ-9)\(^{85}\), anxiety using the Generalized Anxiety Disorder-7 Item (GAD-7)\(^{86}\), and stress using Cohen’s Perceived Stress Scale-10 Item (PSS-10)\(^{87}\). Demographic information was also collected. The estimated time to complete the survey was 35 minutes.

**Dependent Variable**

**Food Addiction** (Cronbach’s \(\alpha = 0.94\)): The YFAS 2.0 is a 35-item validated tool used to diagnose food addiction. It was designed to reflect the diagnostic criteria for substance use disorder in the DSM-5. The YFAS 2.0 measures symptoms of food addiction, such as “I spent a lot of time eating certain foods throughout the day” or “I avoided work, school, or social activities because I was afraid I would overeat there”. Scores can be computed using a symptom count, in which responses to certain items are used to assess the presence of symptoms such as “persistent desire or repeated unsuccessful attempts to quit” or “continued use despite social or interpersonal problems”. There is a total of 12 possible symptoms. The other method of scoring is using the diagnostic criteria, in which symptom totals are counted. Importantly, the presence of clinically significant impairment or distress is necessary to be diagnosed with food addiction. Using this method, individuals are designated as having no food addiction (1 or fewer symptoms and/or no clinical significance), mild food addiction (2 or 3 symptoms and clinical significance), moderate food addiction (4 or 5 symptoms and clinical significance), or severe food addiction (6 or more symptoms and clinical significance). For analysis, both the symptom count and diagnostic methods were used for descriptive data, and only the diagnostic method was used for correlation analysis and nominal logistic regression.

**Independent Variables**

**Childhood Trauma** (Cronbach’s \(\alpha = 0.77\)): The ACE questionnaire is a 10-item tool that measures an individual’s experience of childhood trauma, such as emotional neglect, physical or sexual abuse, or household dysfunction, during their first 18 years of life. Participants can answer either “yes” or “no” if they experienced each of the 10 events. Affirmative responses are scored as 1 and summed to indicate total ACE scores. Responses can be analyzed in a continuous manner or by using a cut-off of 4 or more ACEs indicating a high number of ACEs. Both methods were computed for descriptive
statistics and for correlation and ordinal logistic regression analyses, continuous scores were used.

**Depression** (Cronbach’s $\alpha = 0.90$): The PHQ-9 is a 9-item tool used to measure an individual’s depression symptoms over the prior 2 weeks. Symptoms include “feeling tired or having little energy”, “little interest or pleasure in doing things”, and “trouble concentrating on things, such as reading the newspaper or watching television” with response options of “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed and scored from 0 to 27 with higher scores indicating higher symptoms of depression.

**Anxiety** (Cronbach’s $\alpha = 0.92$): The GAD-7 is a 7-item tool that asks respondents questions on their experience of anxiety symptoms over the prior 2 weeks. Symptoms include items such as “feeling nervous, anxious, or on edge”, “trouble relaxing”, and “becoming easily annoyed or irritable”. Response options include “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed for a total of 0 to 21 with higher scores indicating more symptoms of anxiety.

**Stress** (Cronbach’s $\alpha = 0.86$): The PSS-10 is a scale that contains 10 items on perceived stress over the past month. Items include questions such as “How often have you been upset because of something that happened unexpectedly?” and “How often have you felt that you could not cope with all the things that you had to do?” with response options of “Never”, “Almost never”, “Sometimes”, “Fairly often”, and “Very often”. Scores are summed for a total of 0 to 40 with higher scores indicating higher stress.

Demographic variables included assigned sex at birth, gender, age, race/ethnicity, year in school, and height and weight.

Statistical Analysis

Descriptive statistics were computed for all demographic variables as well as for food addiction, ACEs, depression, anxiety, and stress. BMI (body mass index, kg/m2) was calculated from participants’ self-reported height and weight and categorized using the World Health Organization (WHO) BMI classification guide. For descriptive statistics, YFAS was scored both in a continuous and ordinal fashion. For example, YFAS symptom counts and diagnoses were computed according to protocol, and diagnoses of mild, moderate, and severe food addiction were computed. Distributions were checked for skewness and kurtosis. Variables that lacked normality were transformed. When reporting the results, untransformed means were used in order to reflect the meaningful values indicated by protocol descriptions for the survey tools used.

For bivariate analysis, a diagnosis of no food addiction was computed as 0, and diagnoses of mild, moderate, and severe food addiction were grouped together and designated as 1. Simple logistic fit was used to determine significant associations between food addiction and continuous sociodemographic and psychosocial variables and Chi-square was used for significant associations between categorical
sociodemographic variables. All significant variables from this analysis were placed into a full logistic regression model to predict food addiction. Data were analyzed using JMP Pro Version 16.0. Significance criterion alpha for all tests was 0.05.

**Qualitative Approach**

**Development of Interview Questions**

Interview questions were developed by the Lifestyle Intervention Research Lab at WVU. The questionnaire followed a semi-structured, open-ended question format. Questions were generated based on aspects of the survey that needed further exploration. The entire questionnaire contained 13 questions with 9 probes. The questions analyzed for this study were under the topic of “Early Life Influences” and “Emergence of Symptoms”. Below are the questions used for this analysis.

1. Please describe to me your eating environment growing up, family attitudes towards food, family meal practices, or anything related to that.
2. Around what time in your life did you notice these symptoms start to appear?
   a. Probe: What was going on around that time that you feel could have contributed to the emergence of these symptoms?

**Participants and Conducting of Interviews**

Participants who had a diagnosis of food addiction from their survey responses and who indicated they would be willing to be contacted to participate in another interview were emailed the invitation to participate and schedule an interview via Zoom, a virtual meeting platform. Individuals who agreed to participate signed additional consent before completing the interview. Interviews were audio recorded for transcription purposes.

**Data Analysis**

Thematic analysis, which is gleaning major themes and subthemes from qualitative data, was used to analyze data. Interviews were transcribed verbatim from the audio recordings. All interviews were reviewed multiple times before coding began. To code data, responses to the questions under the topic of Early Life Influences were reviewed and codes were assigned to responses that had similar qualities. Codes were based on subjective assessment. After coding all transcripts, the codes were reviewed, and additional codes were added if deemed necessary. Similar codes were grouped together to generate themes and subthemes. Review of themes and subthemes then occurred and necessary changes were made. A secondary reviewer reviewed all themes and subthemes and agreement was reached between both reviewers to generate a final list of themes and subthemes. All themes and subthemes were described and example quotes illustrating the theme were chosen.

**Results**
Quantitative

Respondents (n=1645) were primarily female (76.2%), identified as a woman (73.5%), White (84.4%), had a normal-weight BMI (53.3%), and were most commonly in graduate/professional school (27.0%). The mean age of respondents was 22.03 ± 5.15 years. The mean number of YFAS symptoms was 2.01 ± 2.84 and the mean ACE score was 2.05 ± 2.20. There was an overall 21.9% prevalence of food addiction, with 5.7% of that being mild, 4.7% being moderate, and 11.5% being severe. Tables 1 and 2 below summarize demographic and psychosocial information.

Table 1. Distributions of all demographic variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>400 (23.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>1280 (76.2%)</td>
</tr>
<tr>
<td><strong>Gender Identity</strong></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>391 (23.3%)</td>
</tr>
<tr>
<td>Woman</td>
<td>1235 (73.5%)</td>
</tr>
<tr>
<td>Nonbinary</td>
<td>46 (2.7%)</td>
</tr>
<tr>
<td>Other/Self-describe</td>
<td>8 (0.5%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>1416 (84.4%)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>44 (2.6%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>67 (4.0%)</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>35 (2.1%)</td>
</tr>
<tr>
<td>Multiracial or Biracial</td>
<td>100 (6.0%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td>Race/ethnicity not listed here</td>
<td>14 (0.8%)</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>295 (17.6%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>281 (16.7%)</td>
</tr>
<tr>
<td>Junior</td>
<td>307 (18.3%)</td>
</tr>
<tr>
<td>Senior</td>
<td>343 (20.4%)</td>
</tr>
<tr>
<td>Graduate/Professional School</td>
<td>454 (27.0%)</td>
</tr>
<tr>
<td><strong>BMI Categories</strong></td>
<td></td>
</tr>
<tr>
<td>Underweight (&lt;18.5 kg/m²)</td>
<td>85 (5.1%)</td>
</tr>
<tr>
<td>Normal range (18.5-24.9 kg/m²)</td>
<td>892 (53.3%)</td>
</tr>
<tr>
<td>Overweight (25.0-29.9 kg/m²)</td>
<td>396 (23.7%)</td>
</tr>
<tr>
<td>Obese (30.0+ kg/m²)</td>
<td>300 (17.9%)</td>
</tr>
</tbody>
</table>

Demographic data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. BMI body mass index (kg/m²).

Table 2. Distributions of all psychosocial variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>22.03 ± 5.15 (21.8, 22.3)</td>
</tr>
</tbody>
</table>
Food Addiction
- None (≤1 symptom or no CS) 1285 (78.1%)
- Mild (2-3 symptoms and CS) 93 (5.7%)
- Moderate (4-5 symptoms and CS) 78 (4.7%)
- Severe (6+ symptoms and CS) 189 (11.5%)

ACE Levels
- Low (<4) 1175 (75.8%)
- High (>4) 376 (24.2%)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YFAS Symptoms</td>
<td>2.01 ± 2.84 (1.87, 2.15)</td>
</tr>
<tr>
<td>ACE Score</td>
<td>2.05 ± 2.20 (1.94, 2.16)</td>
</tr>
<tr>
<td>PHQ-9 Score</td>
<td>9.46 ± 6.57 (9.14, 9.77)</td>
</tr>
<tr>
<td>GAD-7 Score</td>
<td>8.60 ± 6.07 (8.31, 8.89)</td>
</tr>
<tr>
<td>PSS-10 Score</td>
<td>20.3 ± 7.07 (19.98, 20.68)</td>
</tr>
</tbody>
</table>

Psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation; YFAS Yale Food Addiction Scale; CS Clinical Significance; ACE Adverse Childhood Experiences; PHQ-9 Patient Health Questionnaire 9-Item; GAD-7 Generalized Anxiety Disorder-7 Item; PSS-10 Perceived Stress Scale-10 Item; CI Confidence Interval.

Simple logistic fit showed that ACE scores, depression, anxiety, stress, and sex were significantly associated with food addiction status (p<.0001 for all), but age, grade, and race were not significant. All significant variables were placed into a full logistic regression model to predict any food addiction from all significant variables from Pearson’s r analysis. Depression was the only significant predictor of the development of food addiction, with each point increase on the depression scale increasing the odds of food addiction by 233% (OR = 3.33 95% CI 2.19, 5.05). Being female was trending towards significance. Results are shown in Table 3.

Table 3. Logistic regression model predicting food addiction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE Score</td>
<td>1.05</td>
<td>(0.82, 1.35)</td>
<td>.6770</td>
</tr>
<tr>
<td>Depression</td>
<td>3.33</td>
<td>(2.19, 5.05)</td>
<td>&lt;.0001*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.98</td>
<td>(0.69, 1.38)</td>
<td>.8974</td>
</tr>
<tr>
<td>Stress</td>
<td>1.03</td>
<td>(0.99, 1.07)</td>
<td>.1758</td>
</tr>
<tr>
<td>Sex</td>
<td>1.59</td>
<td>(0.99, 2.55)</td>
<td>.0572</td>
</tr>
</tbody>
</table>

Selection criteria for the model entry was p<0.05. Variables from simple analyses were entered into a nominal logistic regression model. Depression remained a significant predictor of the development of food addiction, with being female trending towards significance. ACE score, anxiety, and stress were not significant predictors.
Qualitative Results

Of the 360 participants in the survey who had a diagnosis of food addiction, 241 agreed to be contacted for an interview. Of the 241 emails sent, 40 responded to schedule an interview time. Four participants did not show up for their interviews, resulting in 36 interviews being conducted.

Interview Participant Characteristics

Interview participants were mostly diagnosed as having severe food addiction (72.2%), with 11.1% having moderate and 16.7% having mild. The mean ACE score was 2.61 ± 2.16, with 30.6% having a high number of ACEs, and the mean number of YFAS symptoms was 6.75 ± 2.71. Most participants were female (80.6%), White (88.9%) and in graduate/professional school (30.6%). The mean age of participants was 22.1 ± 4.63 years and the mean BMI was 29.7 ± 8.30 kg/m², with most (36.1%) falling into the obese category. Interview participant characteristics are reported in Table 4.

Table 4. Distributions of demographic and psychosocial variables of interview participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N)(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Addiction</strong></td>
<td></td>
</tr>
<tr>
<td>Mild (2-3 symptoms and CS)</td>
<td>6 (16.7%)</td>
</tr>
<tr>
<td>Moderate (4-5 symptoms and CS)</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Severe (6+ symptoms and CS)</td>
<td>26 (72.2%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7 (19.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>29 (80.6%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>32 (88.9%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>10 (27.8%)</td>
</tr>
<tr>
<td>Junior</td>
<td>3 (8.3%)</td>
</tr>
<tr>
<td>Senior</td>
<td>8 (22.2%)</td>
</tr>
<tr>
<td>Graduate/Professional School</td>
<td>11 (30.6%)</td>
</tr>
<tr>
<td><strong>BMI Category</strong></td>
<td></td>
</tr>
<tr>
<td>Underweight (&lt;18.5 kg/m²)</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Normal range (18.5-24.9 kg/m²)</td>
<td>9 (25.0%)</td>
</tr>
<tr>
<td>Overweight (25.0-29.9 kg/m²)</td>
<td>12 (33.3%)</td>
</tr>
<tr>
<td>Obese (30.0+ kg/m²)</td>
<td>13 (26.1%)</td>
</tr>
<tr>
<td><strong>ACE Levels</strong></td>
<td></td>
</tr>
<tr>
<td>Low (&lt;4)</td>
<td>69.4%</td>
</tr>
<tr>
<td>High (≥4)</td>
<td>30.6%</td>
</tr>
</tbody>
</table>
Demographic and psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation; YFAS Yale Food Addiction Scale; CS Clinical Significance; ACE Adverse Childhood Experiences; CI Confidence Interval; BMI Body Mass Index.

Themes: Early Life Influences

The topic of “Early Life Influences” generated 4 themes. Participants were asked about their eating environment growing up, including their family meal practices and attitudes towards food. A summary of these themes is provided in Table 5.

Table 5. Summary of Themes and Subthemes for Early Life Influences and Emergence of Symptoms.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Theme(s)</th>
<th>Subtheme(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Life Influences</td>
<td>Pressure to be Healthy (n=29)</td>
<td>Diet Culture in Family Restrictive Environment</td>
<td>Participants expressed growing up in environments that had an emphasis on an ideal body weight or physique. They often were restricted on what foods they were allowed to eat, with parents or other role models modeling restrictive behaviors and placing this on participants.</td>
</tr>
<tr>
<td></td>
<td>Positive Family Emphasis on Food  (n=19)</td>
<td></td>
<td>Participants described growing up in an environment where family mealtime was important, with an emphasis on togetherness and positive memories being associated with mealtime.</td>
</tr>
<tr>
<td></td>
<td>Unhealthy Eating Environment (n=16)</td>
<td></td>
<td>Participants felt they had no guidance on healthy eating or portion control or grew up in a family that relied on cheap, unhealthy foods due to budget constraints.</td>
</tr>
<tr>
<td></td>
<td>Negative Influence of Family Dinner (n=9)</td>
<td></td>
<td>Participants associated family mealtime with negative memories, such as conflict or being pressured to finish their meal to the point of discomfort.</td>
</tr>
<tr>
<td>Emergence of Symptoms</td>
<td>Transition to College (n=22)</td>
<td>Newfound Freedom</td>
<td>Participants felt that their symptoms began to emerge once they began college, partially due to the increased stress of the transition, and others feeling it was the widespread access to</td>
</tr>
</tbody>
</table>
food. Participants expressed that the new ability to make their own food choices led them to overconsume unhealthy foods.

<table>
<thead>
<tr>
<th>Pressures in School and Relationships (n=14)</th>
<th>Participants noticed their symptoms emerge once they began to feel pressures to adhere to an ideal body type in middle school and high school. They often described comparing themselves to peers and often turned to foods for comfort at this time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triggering Event (n=19)</td>
<td>Participants could recall a specific event or situation that led to their emergence of symptoms. These included parental divorce, moving, the end of a sport, or the end of a relationship. Food provided stability for many participants during these uncertain times.</td>
</tr>
<tr>
<td>Worsening Mental Health (n=12)</td>
<td>Participants saw a direct correlation between when their depression or anxiety worsened and their symptoms started to become a problem.</td>
</tr>
<tr>
<td>Unhealthy Relationship from the Start (n=9)</td>
<td>Participants felt that they couldn’t remember when the symptoms started, but that they have always had problems with eating and with food.</td>
</tr>
</tbody>
</table>

**Pressure to Be Healthy.** The most prominent theme established under this topic was *Pressure to Be Healthy*, in which participants described growing up in an environment that they were constantly reminded about the effects of food on their bodies, with an overall emphasis placed on eating healthy and staying lean. This theme had three subthemes. The first, *Diet Culture in Family*, encompassed participants describing their parents, especially their mothers, or grandparents consistently going on diets and witnessing those behaviors. One participant stated, “My mom was a nurse and she’s very big on health so I don’t think there was ever a month going by where she wasn’t on a new diet, so diet culture was very big in my house, with like Skinny Pop and special smoothies, that stuff was just constantly on me.” Other participants also described that these influences were pushed onto them, for example, “Whenever I was younger, my mother had some disordered eating issues and I think that unknowingly she put a lot of that on me and that kind of caused a lot of my habits. Like her saying I shouldn’t eat all of this or making comments that weren’t intentionally hurtful but were.”

The second subtheme was *Restrictive Environment*, where participants described that their parents limited any foods that were deemed unhealthy, with some parents even locking away unhealthy foods. Some participants reflected that this was the beginning of what led to their current symptoms. A participant described this, saying,
“It came to the point where like the pantry was locked, so anytime there was food I would eat as much of whatever I could find, especially if it was something I wasn’t normally allowed to eat.”

The third subtheme was Body Image Pressures, where participants described consistently being reminded of their weight or being pressured to adhere to an ideal body image. A participant stated, “The house that we grew up in was built around the idea that maintaining that healthy or thin physique was the only way you were going to end up being happy in life and I was never able to fit that mold. So, it was generally harder on me, you know, feeding me less food than I would have liked.” Another participant reflected on how this affected not only her but her siblings, saying, “Growing up our household was either told ‘you’re too skinny’ or ‘you’re too fat’ or ‘you’re eating too much, you’re eating too little’ and so it’s kind of like no healthy boundaries when it comes to food in my household. So, me and my brother and sister, we all have a really unhealthy relationship with food.” Body image pressures were also placed on participants who played sports and felt pressure from parents and coaches to maintain a certain physique or follow a certain diet to perform well in sports. A participant stated, “It was either coaches or family members that would be like ‘you have to watch what you eat to perform a certain way’ and then I felt like I had restrictions put on myself and then I would overthink about my body and that kind of continued on.”

Positive Family Emphasis on Food. A large portion of participants (n=19) described that they grew up in a positive food environment. Participants stated that eating and cooking together was important in their families, and food was often associated with social events and displays of love and affection. For example, a participant stated, “We’ve always tried to do a family dinner every night to just kind of come together and reconnect, which is really nice. It’s definitely a social aspect, we make time for it even with my extended family.” Another participant echoed this, saying, “I guess our whole family has a very healthy relationship with food, maybe that stems from eating together…positive memories with it because I can think back to times where I’m just laughing at something someone said or making fun of each other, so definitely positive memories are linked to food.”

Unhealthy Eating Environment. Participants described being surrounded by unhealthy food, witnessing parents consistently overeat, or having no understanding of what food provides proper nutrition. Participants described not being guided on nutrition or portion sizes. For example, a participant stated, “I was given like no guidance on nutrition or portion sizes or things like that so I just remember growing up eating huge, gigantic portions and just not understanding that that’s not good for me.” Other participants described growing up in an environment where they relied on cheap or processed foods. A participant described this, saying, “Mom kind of just did what she could to make ends meet and she would grocery shop once a month and it’d be gone in two weeks and then those last two weeks we were living off of ‘the poor man’s meal’. We chopped up potatoes and onions and hot dogs and that would be the meal, it was pretty bad.”

Negative Influence of Family Dinner. The final theme for this topic was generated from participants reflecting on negative memories associated with family dinner.
Participants described family dinner being associated with conflict, saying, “It was always that I would try not to talk too much because my mom would attack anything you say or do if it’s not to her standards and then I would just want to finish it all up and then leave.” Many participants described that they were always instructed to finish their plate, to the point where they would be in a state of discomfort. One participant stated, “You had to finish your meal, and I wasn’t allowed to leave. It’s stressful if you’re really full and don’t want to finish your meal.”

**Themes: Emergence of Symptoms**

Participants were asked around what time in their life their symptoms started to occur and what was going on in their life around that time. Responses to these questions under the topic of Emergence of Symptoms generated 5 themes and 1 subtheme, with a summary provided in Table 5.

**Transition to College.** Almost two-thirds of participants (n=22) stated that they noticed their behaviors start to appear once they began college. Participants found that the increased stress and changing environment were contributing factors to their eating behaviors. A participant stated, “It was a big move leaving home to go to college, you know like personal issues that may have added to the stress and exacerbated by that.” Participants who had begun college during COVID-19 especially felt this way, saying, “I think coming to college, especially freshman year with COVID, is really what kind of set it off or I realized I didn’t have control of this coping mechanism…because all I know is that I wasn’t really allowed to go anywhere, not really allowed to do anything and I could go to the cafeteria and be there as long as I want to.” Many participants felt that a very significant factor was their ability to make their own decisions, generating the subtheme of Newfound Freedom. A participant stated, “Having a dorm room and having all those freedoms of being in college I was like ‘Oh I can go to the grocery store, I can go get all of this stuff for myself’ and what I was eating wasn’t healthy for me.” This was especially true for participants who had grown up in a restrictive environment, with a participant feeling that led to her taking advantage of being on her own in college, saying, “It became me always seeking that moment of being able to eat and associating food with freedom and having some time to myself and being happy so I began to pursue that more and it kind of spiraled out of control from there.”

**Pressures in School and Relationships.** Participants described that they noticed their eating habits become a problem or change when they began to feel pressure for ideal body types from their peers and social media, or when they had increased stress or low self-esteem in middle school and high school. This led some participants to go to food for comfort. A participant said, “I was in middle school and I just kept thinking everyone else was better than me because I knew I was bigger and food was there all the time so I was just like ‘here’s my pal!’.” Other participants noticed this is when they began to have more restrictive behaviors, with one saying, “I was always conscious about appearance and health and during junior year of high school I thought I was just going to completely cut sugar out of my diet.” Participants also described that this time period was “when the social media boom hit” saying that this led to more exposure to “the ideal body type”. Female participants described comparing themselves to their friends. A
participant said, “I remember always being aware that like my friends and I would eat the same thing and the next day I was 2 pounds heavier, I swear.”

**Triggering Event.** Many participants could trace the emergence of their symptoms to a specific event that occurred in their childhood or young adulthood. Most of these were family events, such as moving or parents getting divorced. A participant felt that because they were always moving, food provided stability that she didn’t have elsewhere, saying, “My dad was always switching jobs so we would move state to state when it wasn’t really necessary so I never had a stable environment, I wanted to have control over something so that’s a huge part of it.” Another participant stated, “My parents got divorced and that’s when the disordered eating started happening.” Other family events included a relative being diagnosed with a severe illness or finding out about a parent’s infidelity. Some participants saw their symptoms emerge when they were at the end of participating in a sport they had played their whole lives. Participants described that they felt their eating habits to maintain performance while playing their sport carried over and could not be controlled once they weren’t as active, with a participant stating, “I had a massive injury in 7th grade and I couldn’t run at all and at the time I didn’t have to watch what I ate, but after that I put on weight and that’s when the pressure started coming in and thereafter I don’t feel like I regained control of that situation.” Other events described by participants related to the end of a relationship, with a participant stating, “I had a really important relationship to me end and that kind of started it because I felt really inferior throughout that relationship so I wanted to improve myself and I would try dieting and going to the gym.”

**Worsening Mental Health.** Participants reflected that their eating habits changed when their mental health worsened, with some recognizing that they used food to cope. A participant said, “I was diagnosed with depression and I started having anxiety and all of that stuff and it just kind of became a crutch for me, honestly” and another stating, “I’ve had depression and anxiety my whole life and during my darkest points, you could see that in my relationship with food.”

**Unhealthy Relationship from the Start.** The final theme involved participants feeling that they have just always had problems with food and could not recall any certain event or circumstance contributing to the onset of symptoms. One participant said, “As early as I can remember, I never had the best relationship with food so I’ve always been very conscious of it.” Another participant felt she has always had an unhealthy relationship with any type of food, saying, “I wasn’t eating unhealthy foods in excess, but I would eat 7 bananas in one sitting…. we used to grow cherry tomatoes and I would eat 100 of them in one sitting. I know healthy food is good for you but everything is supposed to be in moderation. I’ve never known moderation. I’ve known all the way or nothing so it’s a really bad thing.”

**Discussion**

The aim of this study was to determine the impact of ACEs and other childhood influences on the development of food addiction in college-attending young adults. There was an overall 21.9% prevalence of food addiction in this sample, which is higher than some other studies examining food addiction in this population. Jahrami et al
found a 20.3% prevalence in females and 17.4% prevalence in males, and Sengor and Gezer found a 21.1% prevalence of high YFAS scores, which are more similar to the findings of the present study. There was a 24.2% prevalence of high ACEs in this study, which is again higher than other studies on the college-attending young adult population. In previous investigations of psychosocial factors at the university used in this study, rates of mental health disorders and ACEs have been higher than other college populations. This population resides in Appalachia, an area plagued by health disparities, which could provide an explanation for this trend.

Quantitative analysis showed that although ACEs were significantly correlated with food addiction. However, when controlling for other potential influences, ACEs did not significantly predict food addiction. The impact of ACEs on the development of food addiction in clinical populations has been found to be significant. ACEs have also been found to be a significant predictor of the development of eating disorders in the clinical population and emotional eating in the general population.

Comorbidities of depression or other mental health disorders are common in the food addiction population and eating disorder population. Depression caused a 233% increased risk of developing food addiction, adding evidence of mental health’s significant influence on eating behaviors. Depression, but not ACEs, being a significant predictor of the development of food addiction in this population was partially explained by qualitative results.

When participants were asked about their eating environment growing up, a variety of themes emerged. Many participants described a pressure to be healthy, which was characterized by an emphasis on diet culture, being conscious of weight, and maintaining a certain physique. There were many descriptions of restrictive eating environments, where parents or caregivers would limit the types of food allowed in the home, with some even putting locks on pantries so that participants could not access them. Some participants reflected that they believe this contributed to their current symptoms, where they now overindulged in certain foods due to being deprived of them in childhood. Participants who discussed diet culture and restrictive eating environments commonly brought up their mothers’ eating habits. Research has shown that maternal eating habits are a significant influence on child eating habits, especially on their daughters. Additionally, Birch and Fisher found that when parents strictly control children’s food intake, this can cause the child to have strong preferences for high-fat, energy-dense foods. A qualitative study on food addiction by Paterson et al found similar participant descriptions of restrictive eating environments during childhood. The effects of this environment were further elucidated in the present study when asked about their emergence of symptoms, where participants described entering college was when their symptoms appeared or worsened. This was credited to the newfound freedom of making their own food choices, especially by those who had been restricted growing up. Participants also cited the stress of the transition to college as being a contributing factor to their symptoms. The college environment has a widespread availability of hyper-palatable food and the life-stage of emerging adulthood in this population has been shown to worsen mental health symptoms, especially since COVID-19. This, combined with a restrictive eating environment in childhood, is one way that food addiction was shown to develop in this study.
Participants also described positive eating environments growing up, with an importance of family mealtime, and associated positive memories tied to food and eating. The possibility that individuals with food addiction turn to food due to its association with positive memories needs further exploration. Other eating environments described by participants were characterized by unhealthy and processed foods, and these findings were consistent with the findings from Paterson et al.\textsuperscript{29} Research has shown that early childhood eating habits can extend into adulthood\textsuperscript{99}. This study shows that when combined with other factors, these unhealthy eating practices can develop into food addiction. Participants also described negative associations with family dinner, and the possibility of food becoming a source of anxiety for these participants needs further exploration. The worsening of mental health was another reason for the emergence of symptoms, which aligns with depression being a significant predictor in the quantitative results. Depression and anxiety are shown to be correlated with poorer diet quality\textsuperscript{72,100} as well as overweight and obesity\textsuperscript{101}. These findings contribute to research on these topics, but also show that depression can cause the more severe outcome of food addiction, when combined with other influences.

There were several other themes developed from the emergence of symptoms. Participants described noticing their behaviors once they felt pressure from school and relationships, largely due to body image pressures. Studies have found that body image pressures and consistent comments about weight and shape a significant contributing factor to the development of eating disorders\textsuperscript{102,103}. Participants also discussed their symptoms emerging after triggering events, including parental divorce, moving homes, relationships ending, or other familial distress. The ACE questionnaire captures the experience of childhood trauma, containing items such as sexual or physical abuse, neglect, and household substance use disorders. These findings show that certain events, that are not captured by the ACE questionnaire, can contribute to the development of food addiction. Participants cited that food provided them stability or something to cope with during these stressful times, contributing to the understanding of why food addiction can develop after these life events. It is possible that the evidence for ACEs leading to substance use disorder is consistently seen because ACEs contain more severe instances of trauma. The lack of evidence on ACEs being a significant predictor of food addiction in this study points to the potential that less severe childhood events can cause food addiction, because food is readily available and needed to survive. In other words, it is a more accessible coping mechanism that may require less adverse life events to become dependent on. The other influences captured by qualitative analysis also point to this. However, this needs further exploration.

This study has several limitations. The use of cross-sectional data from one university cannot be generalized to the entire college-attending young adult population. Respondents to the survey were primarily female, and so were interview participants, although food addiction and eating disorders have been shown to occur in higher rates in females than males\textsuperscript{60,104}. This study also showed that being female was trending towards being a significant predictor of the development of food addiction. However, more investigation into food addiction in males is needed. This study also has several strengths. This is one of the few studies examining food addiction in the college-
attending young adult population, which as in at-risk population. To our knowledge, this is the first mixed-methods study on food addiction in the non-clinical population, and one of the few that examines food addiction qualitatively in any population. Qualitative analysis in this study allowed for further exploration of contributing factors to the development of food addiction.

Conclusion

This study demonstrated that there are many factors contributing to the development of food addiction in the non-clinical population. Although ACEs contribute to the development of obesity and substance use disorder, other childhood influences, such as restrictive eating environments, are potential contributing factors to young adulthood food addiction. Further, the college environment, characterized by high stress and widespread availability of food, is when most participants’ symptoms developed. This adds evidence to the risk of development of food addiction in this population and highlights that resources and treatments for food addiction are needed on university campuses. Providing accessible counseling with therapists and dietitians is one potential way to treat this issue.
Chapter V: Psychosocial Characteristics of College-Attending Young Adults with Food Addiction
ABSTRACT

Background: Despite emerging evidence on the existence of food addiction, little is known about the psychosocial characteristics of individuals with food addiction in the non-clinical population yet it has shown to be highest in the young adult age group. The aim of this study was to examine the psychosocial characteristics of food addiction in the college-attending young adult population.

Methods: Students attending a university in Appalachia were invited to participate in an institutional review board approved, online survey in November 2021. Survey measures included self-reported food addiction, Adverse Childhood Experiences (ACEs), depression, anxiety, stress, social support, eating disorder symptoms, post-traumatic stress disorder (PTSD symptoms), coping styles, and emotion regulation. Kruskal-Wallis H was used to determine differences in mean scores of psychosocial variables among different levels of food addiction. Participants who met the criteria for food addiction were invited to participate in an interview that further explored their perceptions and symptoms of food addiction. Interviews were transcribed and thematically analyzed. All quantitative data was analyzed using JMP Pro Version 16.0 and all qualitative data was analyzed using NVIVO Software Version 12.0.

Results: Respondents (n=1645) had a 21.9% prevalence of food addiction. Individuals with food addiction had significantly higher depression, anxiety, stress, and ACEs, lower social support, greater use of avoidant and emotion-focused coping, and more difficulties with emotion regulation (p<.01 for all) than individuals without food addiction. Interview participants (n=36) felt that food addiction is similar to other addictions, is largely a way of coping and regulating emotions, and had a significant mental preoccupation with food. Participants described food addiction negatively impacting their social and professional life, self-image, and relationships. Participants also described using food to cope with emotions, having strong cravings and tolerance/withdrawal symptoms, and expressed a desire to spend less time thinking and stressing about food.

Conclusion: This study shows the significant mental and emotional burden faced by individuals with food addiction, aligning with other addictions. Qualitative findings provide a better understanding of food addiction symptoms and their effects on participants.
Introduction

Within the United States, rates of obesity are continually a topic of concern, with recent estimates that 42.4% of adults being overweight or obese. Obesity research focuses largely on overall caloric intake, in which researchers and clinicians believed that if an individual has accurate information and motivation to change dietary intake, they can successfully reduce their caloric intake. However, weight gain is usually the result of a complex interaction between an individual’s biology and environmental factors. There are many factors that can influence an individual’s eating habits, including stress, mental health disorders, and environmental factors. For example, stress has been shown to induce overeating and cravings for hyper-palatable foods (foods that contain high amounts of salt, sugar, or fat), and individuals with mental health disorders, such as depression, have been shown to have lower diet quality than those without. Further, the food environment in the US today is characterized by the widespread availability of hyper-palatable foods and a focus on convenience items that are eaten for pleasure rather than sustenance. There is compelling evidence that these hyper-palatable foods can be addictive to certain individuals who may be at risk of developing negative coping habits or addictive behaviors.

Food addiction, which can be defined as “a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high pleasure, energy, or excitement, or to relieve negative emotional or physical states”, has gained increasing attention since 2009, when Gearhardt and colleagues developed the Yale Food Addiction Scale (YFAS) to diagnose food addiction. Using this scale, the prevalence has ranged between 5-10% in non-clinical samples, 15-25% in obese samples, and 30-50% in morbidly obese bariatric patients or obese individuals with binge eating disorder. Investigations into this population thus far have mainly focused on the clinical population and females over age 35. Quantitative investigations have found that individuals with food addiction have higher emotional dysregulation, higher non-acceptance of emotional responses, poor impulse control, and a lack of emotional clarity, which are the same patterns seen in individuals with substance use disorder. These studies have also found higher rates of childhood trauma and abuse as well as post-traumatic stress disorder (PTSD). Qualitative data has demonstrated that food addiction causes psychosocial distress through negative impact on self-image, emotional and interpersonal impairments, mental preoccupation, and loss of control.

College-attending young adults are at a life-stage during which mental illnesses often first arise and lifelong behaviors are established. Recent estimates of depression and anxiety in college students are 19% and 23.6%, respectively. There is a high rate of the use of maladaptive coping mechanisms in this population, with 38% reporting weekly binge drinking and 15% reporting the use of electronic cigarettes. Food addiction can be conceptualized as a health behavior or as a negative coping mechanism. College students may be at risk of developing food addiction to cope with the stress of the college environment as well as the higher exposure to hyper-palatable foods, inability to prepare healthy meals, and an irregular
lifestyle. Investigations into college students are minimal to date, but have found that young adults with food addiction have poor sleep, anxiety/depression, a range of BMIs, the presence of other eating disorder symptoms, and higher rates of impulsivity. There is further a lack of qualitative analysis of the experiences of food addiction in this population. More investigation is needed into the psychosocial characteristics of this at-risk population in order to contribute to the understanding of this phenomenon and move towards development of treatments. This study aimed to investigate the psychosocial characteristics, including their mental health, coping, and emotion regulation, of college-attending young adults with food addiction. It was hypothesized that individuals with food addiction would have significantly worse mental health, unhealthy coping, and difficulty with emotion regulation compared to those without food addiction.

Methods

Study Design

This mixed-methods study used a sequential explanatory analysis approach in which quantitative data is collected first, analyzed, and then used to collect qualitative data to contribute to explanation of findings from the quantitative study. To achieve this, a cross-sectional study was first conducted to examine a sample of young adults attending a large, Appalachian university in fall 2021. Participants were currently enrolled college students. Following quantitative analysis, participants with food addiction, diagnosed using the YFAS, were invited to complete the qualitative portion of semi-structured open-ended interviews to elucidate other causes or contributing factors to their development of food addiction. All subjects gave their written informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Institutional Review Board at West Virginia University (#2106344268).

Participants and Procedures

A convenience sample of undergraduate and graduate students between the ages of 18 and 29 attending a large, land-grant university in central Appalachia were recruited during the fall 2021 semester. A list of emails of all active and registered students during the fall 2021 semester was obtained and students were emailed an invitation to participate that included a link to an anonymous online Qualtrics survey (Qualtrics, Provo, IT, USA). Participants were instructed to read the informed consent and if they agreed to participate, they proceeded to complete the survey. Students who denied participation were thanked for their time and were exited from the survey. The survey took approximately 35 minutes to complete. After completing the survey, students were informed that the primary outcome of the study was food addiction and were asked if they would be willing to be contacted again to participate in an interview if they are diagnosed with food addiction based on their responses. If they agreed, they provided their email for future contact. Students were incentivized to complete the survey by a chance to win one of three $100 American Express gift cards by entering their contact information following survey completion.
Quantitative Approach

Survey Design

This 97-item survey was developed by the Lifestyle Intervention Research Lab at WVU using validated tools to investigate a breadth of psychosocial and behavioral characteristics of college-attending young adults. The variables utilized in this study were food addiction using the Yale Food Addiction Scale 2.0 (YFAS 2.0)\(^{57}\), childhood trauma using the Adverse Childhood Experience (ACE) Questionnaire\(^{84}\), depression using the Patient-Health Questionnaire (PHQ-9)\(^{85}\), anxiety using the Generalized Anxiety Disorder-7 Item\(^{86}\), stress using Cohen’s Perceived Stress Scale-10 Item\(^{87}\), emotion regulation using the Difficulties in Emotion Regulation Scale-Short Form\(^{109}\), post-traumatic stress disorder using the Primary Care PTSD Screen for DSM-5 (PC-PTSD-5)\(^{110}\), social support using the Oslo Social Support Scale-3 Item (OSSS-3)\(^{111}\), and coping styles using the Brief COPE\(^{112}\).

Independent Variable

Food Addiction (Cronbach’s \(\alpha = 0.94\)): Food addiction was measured using the YFAS 2.0, a 35-item validated tool used to diagnose food addiction. It was designed to reflect the diagnostic criteria for substance use disorder in the DSM-5. The YFAS 2.0 measures symptoms of food addiction, such as “I spent a lot of time eating certain foods throughout the day” or “I avoided work, school, or social activities because I was afraid I would overeat there”. Scores can be computed using a symptom count, in which responses to certain items are used to assess the presence of symptoms such as “persistent desire or repeated unsuccessful attempts to quit” or “continued use despite social or interpersonal problems”. There is a total of 12 possible symptoms. The other method of scoring is using the diagnostic criteria, in which symptom totals are counted. Importantly, the presence of clinically significant impairment or distress is necessary to be diagnosed with food addiction. Using this method, individuals are designated as having no food addiction (1 or fewer symptoms and/or no clinical significance), mild food addiction (2 or 3 symptoms and clinical significance), moderate food addiction (4 or 5 symptoms and clinical significance), or severe food addiction (6 or more symptoms and clinical significance). Clinical significance is defined as significant social or interpersonal distress.

Dependent Variables

Childhood trauma (Cronbach’s \(\alpha = 0.77\)): The ACE questionnaire is a 10-item tool that measures an individual’s experience of childhood trauma, such as emotional neglect, physical or sexual abuse, or household dysfunction, during their first 18 years of life. Affirmative responses are scored as 1 and summed to indicate total ACE scores. Responses can be analyzed in a continuous manner, with higher scores indicating a high level of childhood trauma.

Depression (Cronbach’s \(\alpha = 0.90\)): The PHQ-9 is a 9-item tool used to measure an individual’s depression symptoms over the prior 2 weeks. Symptoms include “feeling tired or having little energy”, “little interest or pleasure in doing things”, and “trouble
concentrating on things, such as reading the newspaper or watching television” with response options of “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed and scored from 0 to 27, with higher scores indicating more severe depression.

Anxiety (Cronbach’s $\alpha = 0.92$): The GAD-7 is a 7-item tool that asks respondents questions on their experience of anxiety symptoms over the prior 2 weeks. Symptoms include items such as “feeling nervous, anxious, or on edge”, “trouble relaxing”, and “becoming easily annoyed or irritable”. Response options include “Not at all”, “Several days”, “More than half the days”, and “Nearly every day”. Scores can be summed for a total of 0 to 21, with higher scores indicating worse anxiety.

Stress (Cronbach’s $\alpha = 0.86$): The PSS-10 is a scale that contains 10 items on perceived stress over the past month. Items include questions such as “How often have you been upset because of something that happened unexpectedly?” and “How often have you felt that you could not cope with all the things that you had to do?” with response options of “Never”, “Almost never”, “Sometimes”, “Fairly often”, and “Very often”. Scores are summed for a total of 0 to 40, with higher scores indicating higher stress.

Emotion Regulation (Cronbach’s $\alpha = 0.91$): The DERS-SF contains 18 items that measure emotion regulation. Respondents indicate how often statements such as “I pay attention to how I feel”, “When I’m upset, I become out of control”, or “When I’m upset, it takes me a long time to feel better” apply to them. It contains subscales of strategies, non-acceptance, impulse, goals, awareness, and clarity, with the highest possible score in each being 15. Higher scores in each subscale indicate more difficulty with that specific emotion regulation strategy.

PTSD (Cronbach’s $\alpha = 0.70$): The PC-PTSD-5 contains 5 questions related to the experience of PTSD symptoms over the past month. Symptoms include “constantly on guard, watchful, or easily startled” and “feeling guilty or unable to stop blaming yourself or others for the events or any problems the event may have caused” with response options of “Yes” or “No”. Affirmative responses are scored as 1 and summed.

Social Support (Cronbach’s $\alpha = 0.79$): The OSSS-3 is a 3-item scale that measures respondents perceived social support with statements such as “How many people are so close to you that you can count on them if you have great personal problems?”. Scores can be summed in a continuous manner with higher scores indicating higher social support.

Coping Styles (Cronbach’s $\alpha = 0.85$): The Brief COPE is a 28-item tool that measures different coping strategies such as “I’ve been giving up trying to deal with it” and “I’ve been getting comfort and understanding from someone”. Respondents indicate how often they have been using each style, with options of “I haven’t been doing this at all”, “A little bit”, “A medium amount”, and “I’ve been doing this a lot”. The most common scoring method is use of the 3 overarching coping styles of problem-focused coping, emotion-focused coping, and avoidant coping. Higher scores in each subscale indicate more use of the coping method. The maximum score in each subscale is 4.
Statistical Analysis

Descriptive statistics were computed for all aforementioned variables, including frequencies for categorical variables and means and standard deviations for continuous variables. Skewness and kurtosis were checked for normal distribution. If distributions were not normal, transformations were conducted to improve normality. BMI was calculated from participants’ self-reported height and weight and categorized using the World Health Organization (WHO) BMI classification guide88. Participants were categorized as having no, mild, moderate, or severe food addiction based off of YFAS 2.0 scoring criteria. All psychosocial variables were left continuous for analysis. To examine differences in mean scores of various psychosocial variables among different levels of food addiction, One-Way ANOVA was used. Levene’s test was used to check for homogeneity of variance. Criteria for homogeneity of variance was not met, so Kruskal-Wallis was used in place of One-Way ANOVA. Steel with control was conducted to compare individuals with no food addiction to individuals with severe food addiction. Significance was set at <.05.

Qualitative

Development of Interview Questions

The semi-structured, open-ended Interview questions were developed by the Lifestyle Intervention Research Lab at WVU. Questions were generated based off of areas of the survey that needed further exploration. The entire questionnaire contained 13 questions with 9 probes. Questions were organized by topic. The questions analyzed for this study were under the topics of “Perceptions of Food Addiction”, “Experience of Symptoms”, and “Ideal Relationship with Food”. Questions from these topics are displayed below.

Table 1. Topics and questions used for thematic analysis.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Question(s)</th>
</tr>
</thead>
</table>
| Perceptions of Food Addiction | 1. Have you ever heard the term “food addiction” used?  
2. How would you describe the concept of food addiction to someone who isn't familiar with it? |
| Experience of Symptoms        | 3. Now I’m going to read some of the symptoms of food addiction to you and you can tell me whether or not you have experienced these symptoms and describe them if so.  
a. Spending a lot of time obtaining food, consuming food, or thinking about food  
b. Skipping activities because certain foods would be there OR because certain foods would not be there  
c. Continuing to eat certain foods despite emotional or physical consequences  
d. Using foods to feel better  
4. Have you ever felt withdrawal from not eating certain foods? |
5. Have you ever felt tolerance to consuming certain foods, in the sense that the amount you used to consume does not provide the same amount of satisfaction anymore so you have had to increase the amount?

6. Please describe, if at all, how food addiction has interfered with your personal or professional life.

<table>
<thead>
<tr>
<th>Ideal Relationship with Food</th>
<th>7. Ideally what would you like your relationship with food to look like?</th>
</tr>
</thead>
</table>

Participants and Conducting of Interviews

Participants were eligible to participate if they had a diagnosis of food addiction from their survey responses and indicated they would be willing to be contacted to participate in an interview. Eligible participants were emailed the invitation to participate and schedule an interview via Zoom, a virtual meeting platform. Individuals who agreed to participate signed additional consent before completing the interview. Interviews were audio recorded for transcription purposes.

Data Analysis

Interviews were transcribed from the audio recordings by the primary reviewer (RAW). Thematic analysis, which is gleaning major themes and subthemes from qualitative data, was used to analyze data. All interviews were reviewed in full multiple times before coding began (RAW). Responses to the questions under the topics of Perceptions of Food Addiction, Experience of Symptoms, and Ideal Relationship with Food were coded and grouped together based on similarities. Codes were based on subjective assessment. After coding all transcripts, the codes were reviewed, and additional codes were added if deemed necessary. Similar codes were grouped together to generate themes and subthemes, which were then reviewed for potential changes (RAW). A secondary reviewer (MDO) reviewed all themes and subthemes and agreement was reached between both reviewers to generate a final list of themes and subthemes. All themes and subthemes were described and example quotes illustrating the theme were chosen.

Results

Quantitative

Respondents (n=1645) were primarily female (76.2%), White (84.4%), in graduate/professional school (27.0%), fell into the normal range BMI (53.3%), and had a mean age of 22.03 $\pm$ 5.15 (21.8, 22.3). Table 2 below summarizes demographic information.

Psychosocial Variables
There was a 21.9% prevalence of food addiction, with 5.7% of those cases being mild, 4.7% being moderate, and 11.5% being severe. The mean YFAS symptom count was 2.01 ± 2.84, the mean ACE score was 2.05 ± 2.20, the mean depression score was 9.46 ± 6.57, the mean anxiety score was 8.60 ± 6.07, and the mean stress score was 20.3 ± 7.07. The mean eating disorder symptom score was 11.66 ± 8.17, the mean PTSD score was 2.69 ± 1.82, and the mean social support score was 10.23 ± 2.53. Of the six emotion regulation subscales, goals had the highest score of 9.54 ± 3.63, indicating goal setting is the emotion regulation strategy respondents had the most difficulty with. The coping scores were: problem-focused coping 2.16 ± 0.58, emotion-focused coping 2.12 ± 0.49, and avoidant coping 1.88 ± 0.53. Table 3 below summarizes psychosocial information.

Table 2. Distributions of all demographic variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>400 (23.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>1280 (76.2%)</td>
</tr>
<tr>
<td>Gender Identity</td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>391 (23.3%)</td>
</tr>
<tr>
<td>Woman</td>
<td>1235 (73.5%)</td>
</tr>
<tr>
<td>Nonbinary</td>
<td>46 (2.7%)</td>
</tr>
<tr>
<td>Other/Self-describe</td>
<td>8 (0.5%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>1416 (84.4%)</td>
</tr>
<tr>
<td>Black/African American</td>
<td>44 (2.6%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>67 (4.0%)</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>35 (2.1%)</td>
</tr>
<tr>
<td>Multiracial or Biracial</td>
<td>100 (6.0%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td>Race/ethnicity not listed here</td>
<td>14 (0.8%)</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>295 (17.6%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>281 (16.7%)</td>
</tr>
<tr>
<td>Junior</td>
<td>307 (18.3%)</td>
</tr>
<tr>
<td>Senior</td>
<td>343 (20.4%)</td>
</tr>
<tr>
<td>Graduate/Professional School</td>
<td>454 (27.0%)</td>
</tr>
<tr>
<td>BMI Categories</td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>85 (5.1%)</td>
</tr>
<tr>
<td>Normal range</td>
<td>892 (53.3%)</td>
</tr>
<tr>
<td>Overweight</td>
<td>396 (23.7%)</td>
</tr>
<tr>
<td>Obese</td>
<td>300 (17.9%)</td>
</tr>
</tbody>
</table>

Demographic data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. BMI body mass index (kg/m²).

Table 3. Distributions of all psychosocial variables.
### Psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation; YFAS Yale Food Addiction Scale; ACE Adverse Childhood Experiences; PTSD post-traumatic stress disorder, CI Confidence Interval.

**Differences Between Participants with Different Levels of Food Addiction**

Results from Kruskal-Wallis $H$ showed significant differences in a number of psychosocial variables between individuals with no, mild, moderate, and severe food addiction. Compared to individuals with no food addiction, individuals with mild, moderate, or severe food addiction showed a significantly higher BMI, ACE score, depression score, anxiety score, and stress score ($p<.01$ for all). Additionally, individuals with severe food addiction showed a higher PTSD score ($p<.04$) and a significantly lower social support score ($p<.01$). When examining results of steel with control, differences in BMI, PTSD, and social support scores were only significant between none and moderate and none and severe. Differences in ACE scores were only significantly different between none and severe, and differences in depression,
anxiety, and stress scores were significantly different across all levels. Table 4 displays results from this analysis.

Table 4. Differences in Psychosocial Characteristics Among Different Levels of Food Addiction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>p-value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>24.70 ± 0.16 (24.38, 25.02)</td>
<td>24.20 ± 0.60 (23.02, 25.38)</td>
<td>26.55 ± 0.66 (25.26, 27.85)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: .28</td>
<td>None vs Moderate: &lt;.01*</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
<tr>
<td>ACE Score</td>
<td>1.86 ± 0.06 (1.74, 1.98)</td>
<td>2.55 ± 0.23 (2.11, 2.99)</td>
<td>2.17 ± 0.25 (1.68, 2.65)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: .28</td>
<td>None vs Moderate: .76</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
<tr>
<td>Depression</td>
<td>8.10 ± 0.17 (7.76, 8.43)</td>
<td>13.10 ± 0.64 (11.85, 14.35)</td>
<td>13.02 ± 0.69 (11.67, 14.36)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: &lt;.01*</td>
<td>None vs Moderate: &lt;.01*</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>7.64 ± 0.16 (7.32, 7.96)</td>
<td>11.16 ± 0.61 (9.97, 12.36)</td>
<td>10.10 ± 0.66 (8.82, 11.39)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: &lt;.01*</td>
<td>None vs Moderate: &lt;.01*</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
<tr>
<td>Stress</td>
<td>19.12 ± 0.19 (18.74, 19.49)</td>
<td>24.13 ± 0.72 (22.71, 25.55)</td>
<td>23.0 ± 0.77 (21.49, 24.51)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: &lt;.01*</td>
<td>None vs Moderate: &lt;.01*</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
</tbody>
</table>
There were significant differences in all subscale scores of emotion regulation between those with different levels of food addiction. Individuals with severe food addiction showed higher scores in all types of emotion regulation strategies, indicating more difficulty with emotion regulation. When examining steel with control results, the most significant differences were seen between those with no food addiction versus those with severe food addiction in all emotion regulation strategies. Steel with control demonstrated that differences in strategies, impulse, and goals were significantly different across all comparisons to no food addiction, but non-acceptance, awareness, and clarity showed no significant differences between none and moderate. Table 5 displays results from this analysis.

**Table 5. Differences in Emotion Dysregulation Among Different Levels of Food Addiction.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>p-value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Strategies</td>
<td>6.35 ± 0.09 (6.17, 6.53)</td>
<td>8.06 ± 0.34 (7.39, 8.74)</td>
<td>8.11 ± 0.36 (7.41, 8.81)</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Kruskal-Wallis H showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at \( p < .05 \).
Kruskal-Wallis results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at p ≤ .05. Maximum score for each subscale is 15.

There were significant differences in all coping styles between those with no, mild, moderate, and severe food addiction. Individuals with severe food addiction showed lower scores in use of problem-focused coping compared to those with mild or
no food addiction and higher scores in emotion focused coping and avoidant coping compared to all other groups. The most significant difference between those with severe food addiction and no food addiction was seen in avoidant coping scores based off of steel with control results (p<.01). Steel with control showed that avoidant coping was significantly different across all comparisons to no food addiction, but for problem-focused coping, significant differences were only seen between none and severe, and for emotion-focused coping, significant differences were only seen between none vs mild and none vs severe. Table 6 demonstrates results from this analysis.

Table 6. Differences in Coping Styles Among Different Levels of Food Addiction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>p-value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Problem-Focused</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.18</td>
<td>2.15</td>
<td>2.03</td>
</tr>
<tr>
<td></td>
<td>±0.02</td>
<td>±0.07</td>
<td>±0.07,</td>
</tr>
<tr>
<td></td>
<td>(2.15,</td>
<td>(2.02,</td>
<td>1.89,</td>
</tr>
<tr>
<td></td>
<td>2.22)</td>
<td>2.28)</td>
<td>2.16)</td>
</tr>
<tr>
<td>Emotion-Focused</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.09</td>
<td>2.29</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>±0.01</td>
<td>±0.06</td>
<td>±0.06,</td>
</tr>
<tr>
<td></td>
<td>(2.06,</td>
<td>(2.18,</td>
<td>2.09,</td>
</tr>
<tr>
<td></td>
<td>2.11)</td>
<td>2.40)</td>
<td>2.31)</td>
</tr>
<tr>
<td>Avoidant Coping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.82</td>
<td>2.11</td>
<td>1.99</td>
</tr>
<tr>
<td></td>
<td>±0.02</td>
<td>±0.06</td>
<td>±0.06,</td>
</tr>
<tr>
<td></td>
<td>(1.79,</td>
<td>(1.99,</td>
<td>1.87,</td>
</tr>
<tr>
<td></td>
<td>1.85)</td>
<td>2.23)</td>
<td>2.11)</td>
</tr>
</tbody>
</table>

Kruskal-Wallis results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at p ≤ .05. Maximum score for each subscale was 4.

Qualitative Results

Of the 360 participants in the survey who had a diagnosis of food addiction, 241 agreed to be contacted for an interview. Of the 241 emails sent, 40 responded to
schedule an interview time. Four participants did not show up for their interviews, resulting in a final n of 36 interviews being conducted.

**Interview Participant Characteristics**

Interview participants were mostly diagnosed as having severe food addiction (72.2%), with 11.1% having moderate and 16.7% having mild. The mean number of YFAS symptoms was 6.75 ± 2.71. Most participants were female (80.6%), White (88.9%) and in graduate/professional school (30.6%). The mean age of participants was 22.1 ± 4.63 and the mean BMI was 29.7 ± 8.30, with most (36.1%) falling into the obese category. Interview participant characteristics are reported in Table 7.

**Table 7. Distributions of demographic and psychosocial variables of interview participants.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N)(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Addiction</strong></td>
<td></td>
</tr>
<tr>
<td>Mild (2 or 3 symptoms + clinical significance)</td>
<td>6 (16.7%)</td>
</tr>
<tr>
<td>Moderate (4 or 5 symptoms + clinical significance)</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Severe (6 or more symptoms plus clinical significance)</td>
<td>26 (72.2%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7 (19.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>29 (80.6%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>32 (88.9%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>10 (27.8%)</td>
</tr>
<tr>
<td>Junior</td>
<td>3 (8.3%)</td>
</tr>
<tr>
<td>Senior</td>
<td>8 (22.2%)</td>
</tr>
<tr>
<td>Graduate/Professional School</td>
<td>11 (30.6%)</td>
</tr>
<tr>
<td><strong>BMI Category</strong></td>
<td></td>
</tr>
<tr>
<td>Underweight (&lt;18.5 kg/m²)</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Normal range (18.5 – 24.9 kg/m²)</td>
<td>9 (25.0%)</td>
</tr>
<tr>
<td>Overweight (25.0-39.9 kg/m²)</td>
<td>12 (33.3%)</td>
</tr>
<tr>
<td>Obese (&gt; 30 kg/m²)</td>
<td>13 (26.1%)</td>
</tr>
<tr>
<td><strong>Variable</strong></td>
<td><strong>Mean ± SD (95% CI)</strong></td>
</tr>
<tr>
<td>YFAS Symptoms</td>
<td>6.75 ± 2.71 (5.83, 7.67)</td>
</tr>
<tr>
<td>Age</td>
<td>22.1 ± 4.63 (20.5, 23.76)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>29.7 ± 8.30 (26.90, 32.51)</td>
</tr>
</tbody>
</table>

Demographic and psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation; BMI, body mass index; YFAS, Yale Food Addiction Scale; CI Confidence Interval.
Reactions to Diagnosis of Food Addiction

Participants were asked about their reactions to hearing they have been diagnosed with food addiction based off of their survey responses. Of the 36 participants, 34 stated that they were not surprised at all, with these individuals acknowledging they've always known that they had a problematic relationship with food, and most agreeing that describing it as food addiction was accurate. For example, one participant said “I’m not surprised. I’ve struggled with food and having a healthy relationship with it for a while. Still struggling.” The other two participants stated that they were surprised but felt that it made sense.

Themes: Perceptions of Food Addiction

Participants had a variety of responses when they were asked how they would describe the concept of food addiction, leading to the development of five themes. Themes are summarized in Table 8.

Similarities to Other Addictions. This was the most prominent theme, as it contained the most responses from participants. Participants felt that it’s possible to be addicted to anything that causes any type of positive emotional or neurological reaction. One participant stated “In terms of function it’s just like any other addiction in that at some point the dopamine you get from food, not even just the food itself, becomes something that you need to function emotionally and sometimes because of the emotional instability you get without it, even physically, just to keep up with a normal life but then it starts to get in the way of your functioning because it becomes a needed thing.” Another participant who is in recovery from substance use disorder described it as “It definitely hits the same neural pathways and the same feel good chemicals as drugs do, you know? If you have food that hits a memory of like your grandma’s meatloaf then you’re going to go to that food when you feel bad or to sugar or, you know, to many, many other things.” Participants described how food can displace other things in life. A participant described this as “It’s where the role that food plays in a person’s life disrupts other roles and the decisions that I make whether I’m aware of it or not often times center around food and there can be periods of me focusing on food too much than other times… it is similar to other addictions in that it displaces roles and responsibilities.” Another participant described it as “I think essentially anything like that, is the same, replacing one feeling with something else...whether it’s food, drugs, alcohol, gambling, or sex.” Some participants emphasized that food addiction is similar to other addictions specifically with unhealthy foods, with a participant saying “I definitely think there’s a lot of clinical validity with it because if food was just easy to turn off and turn on you know there’s things in your brain that biochemically make you want salty foods, sweet foods, and if you condition yourself to eat these foods then you’re naturally going to want them.” Some participants felt that food addiction is worse than other addictions because food is everywhere and needed to live. One participant said “Everyone needs to eat! You need food to survive, you don’t need to shoot heroin to survive. So, it is far more difficult to learn to control or limit or navigate a substance that you’ve got to have to survive. Alcoholism will kill you slowly, using heroin or other hard drugs will kill you very quickly, food will kill you very slowly and it alters your genetics in
ways that will predispose your children and your children’s children to these same problems."

**Mental Preoccupation.** This theme was developed after participants consistently described that the mental aspect of food addiction was just as significant as the behavioral aspects. A participant said “I am addicted to all of the thoughts that come along with food, whether that is managing how much I eat or when I eat, what I eat, and in what amounts. All of this, all of the thoughts that surround food would be what I imagine I am addicted to.” Participants described that food addiction involves constant thought about what they are eating or what they just eat, for example, “Honestly I hate it because it disrupts my daily life, you know when someone with food addiction tends to keep thinking about ‘okay what am I going to eat next? How am I going to eat it?’ and then sometimes it’s like ‘okay I’m stuffed but I kind of still want to eat or not eat’ and it kind of consumes my whole day a lot of times.”

**Emotion Regulation and Coping Mechanism.** This theme encompassed participants who felt that food was an emotional outlet or way to cope with other problems in life. A participant described this as “I feel like it’s mostly just either emotional or if someone is trying to fill some sort of void in their life really whether it’s something in their personal life, love life, or work life, it’s just something to kind of fill the void and they’ve been able to fill that for a little bit with food.” Another participant said “It’s pretty much using food for a coping mechanism at an uncontrolled level. Something you can’t really monitor or stop doing whether it’s controlling that amount you eat or the amount you don’t eat.”

**Similarities to Eating Disorders.** This theme involved participants who felt that food addiction aligned with binge eating or other eating disorders, with a participant saying “It works the same way as any other eating disorder where you’re not eating enough food or you’re binging. You’re not necessarily wanting to do that behavior but something is compelling you to do so even if it’s detrimental to you.”

**Lack of Control.** This theme involved responses from participants who felt that food addiction comes down to issues with self-control. A participant described it as “It’s about not being able to stop it from taking over, food addiction is a lack of control.”

**Themes: Experience of Psychosocial Symptoms**

Participants were asked about their current symptoms of food addiction, with six themes emerging.

**Interference with Daily Life.** Participants described many ways how food addiction has impacted their life every day and caused detrimental outcomes. Many discussed how food addiction has had negative impacts on their relationships with friends, family, or significant others. One participant said “Personally, to the people who know what’s going on, those I am closest with, it gets hard for them to see because they know what’s going on and they feel kind of powerless and upset at me because it’s like ‘you know you have a problem but you’re not doing something to fix it’ so it’s upsetting for them.” Other participants state that they try to hide these feelings and behaviors from their loved ones, with one participant saying “I definitely feel a lot of shame and
awkwardness talking about it talking to my fiancé. In this one conversation I’ve told you more than I’ve told anyone else about it. I just don’t talk about it.” Another participant said “It causes tension in my relationships because I start to feel really bad when certain conversations or what people will say will be really triggering to me….my friends want to go somewhere to eat and I don’t want to go to places that have food….I don’t like eating in front of people….I’ve lost a lot of friends because of it and feel isolated because of it.” Participants also described negative impacts on their social life due to skipping events involving food. A participant said, “I definitely skip dinners and meals out at restaurants with family or friends with the fear of coming into contact with certain foods.” Another participant said “I have stopped going to parties because I know if I am in a social situation I’m just not going to stop. It’s become not worth it knowing that I’m just going to - ….especially if it’s an open-buffet situation. I’ve just stopped going.” Participants described the stress of feeling watched by other people when food is involved, with one saying “I have avoided social events where eating is involved because people notice that I really don’t eat in front of them so they always encourage me like ‘you should eat more’ but little did they know I’m actually fighting the struggle with food.” The role food plays in social life was a significant cause of distress for participants, for example “In my personal life it’s really hard to form relationships with people because one of the things that a lot of people use as a like a foundation of relationships is food so it’s really hard when you’re panicking about the food that’s going to be there so I definitely miss out on plenty of events because I was afraid of the food that was going to be there.”

Many participants described how food addiction has impacted their self-image negatively. This largely involved issues related to weight gain because of food addiction behaviors, although some participants felt this way even when at a healthy weight. One participant said “I’ve lost a lot of weight but my self-perception is that I’m a huge person and it’s to the point where I don’t know how big my body is and I’ll give myself more clearance than I need to get around things or I’ll bump into things because I don’t have a perception of where my body is and it’ll totally mess me up and I’ll skip social obligations or I will keep my camera off during Zoom meetings so I don’t have to look at myself or acknowledge the way I look.” Another participant said “I have to plan out what I’m going to wear because if I deviate from that I don’t feel okay and it takes me at least 10 minutes to be like ‘okay you look fine, you don’t look any different from anyone else, nobody is staring at you’….it doesn’t sound that dramatic but the process I go through is very time-consuming.” Participants also described how food addiction has negatively impacted their work or professional life. Sometimes this involved skipping work events that involved food. This also involved being unable to show up for work or class either from having a lack of energy due to restricting food, with one participant saying “I typically don’t get enough nutrients so sometimes I feel like I’m going to pass out and I’m too tired to do things” or from feeling physically ill from having too much food, with one participant saying “My stomach will be so messed up I can’t leave the house so it impacts school.” Participants described how they “felt like a fraud” because their health didn’t align with their professional role. For example, one participant said “I absolutely feel like a fraud if I’m being honest because I’m an (removed for anonymity) major who interns at a rehabilitation and fitness clinic and I feel like I’m taken less seriously because I myself am overweight and they’re probably thinking ‘Who’s this fat guy trying to tell me how to run on a treadmill?’.”
Participants also described how their time spent obtaining food interfered with their daily life. One participant stated that their food addiction interfered with their work, saying “I take a lot of time and I would end up getting the food and a lot of it and I would take a long time to eat it so my boss had a conversation with me about it.” Other participants stated that they often went out of their way to obtain certain foods, for example “Usually when I’m driving by myself I stop at fast food places on the way home knowing that we would be having dinner as a family and eating something then too.” Another participant said “This is a little embarrassing for me to admit but there are these butter-flavored Cheeto puffs, they’re terrible for me because I’m lactose intolerant, but one night I drove to four 7/11s to find them because I could not stand the fact that I did not have them so I spent 2 hours in the middle of the night to go get them.” Other participants described that they will prioritize getting food over anything else. A participant said, “I have a really busy schedule and places I need to physically be but I will make time to stop and get what I want or make sure that I can have time to get food and be late to other things.” Another participant said “As soon as I’m out of the house, this is my first priority.

**Mental Preoccupation.** This theme involved participants discussing that their constant thoughts about food impacted their mood and daily productivity. One participant said “Every day, 24/7, you’re basically thinking about food. What you should eat, what you shouldn’t eat, how you are going to get it, that type of thing.” Many participants described that they are constantly thinking about what they are going to eat next, for example “It’s to the point where I’m not even finished with what I’m currently eating and I’m like ‘What am I going to eat next? What am I going to have for dinner?’.” They also discussed constantly thinking about the effects of what they eat on their body. One participant said, “I think about food a good bit and not necessarily that I want to eat it but more so about the foods I was eating and how that impacted by body and weight.” Participants described feeling constant guilt. A participant described this as “It makes me feel good but then immediately guilty and then I feel guilty about it internally and just mentally get down on myself for the way that I am when I eat. So, it’s a constant cycle of feeling guilty and depressed and upset because of the relationship I have with food.”

**Using Food to Cope with Emotions.** This theme contained responses from participants describing their use of food to help them feel better. This largely involved descriptions of going to food whenever they felt stressed, anxious, worried, or alone. One participant said, “Just as a general coping mechanism, I have some depression and anxiety issues that are both diagnosed and I take medications for and it helps but I still will frequently eat something if I don’t feel good in that way.” Some participants were aware that it doesn’t usually help them feel better, with one participant saying “It’s kind of a weird thing. I’ll keep eating to try to make myself feel better, but I don’t feel better and I know I won’t. But I’m like ‘oh I should eat because it will make me feel better.”

**Strong Cravings.** Participants described what goes through their head when they have cravings for certain foods. A participant described it as “It’ll just be like a roar or like an undeniable thing you can’t ignore, it doesn’t go away, like ‘I want something sweet, I want something sweet, I want something sweet.’” Participants described that despite their best efforts to ignore these cravings, they felt it was impossible. One participant
said “You are trying so hard not to do these things to the point where it’s making you super physically antsy and anxious and it comes to the point where the process of stepping way just doesn’t feel worth it and it feels too difficult and that’s when the folding happens.” Another participant said, “I feel like I’m having intrusive thoughts and it’s hard to focus on other things and it gets overwhelming and I just tell myself I have to give into this behavior.” Some participants who had restrictive eating behaviors felt ignoring cravings were especially difficult, for example “There were certain things my body wasn’t getting so I would be craving it a lot, especially sweets.”

**Tolerance and Withdrawal.** This theme developed from participant descriptions of noticing that they have had to increase their amount of food to achieve certain feelings or get satisfaction, as well as feeling physical and mental effects of abstaining from certain foods. One participant said, “I would go to McDonald’s and I used to just get one double cheeseburger and then it turned into two double cheeseburgers and then two double cheeseburgers with fries and it just kept progressing.” Another participant said, “We’d order a pizza or whatever and I would eat two or three pieces and be good, and now it’s nothing for me to eat a minimum of four and I don’t know why that happened but I could probably eat the entire thing.” Participants who cut out certain foods describe its effect on their mood or energy, with one participant saying, “I went through that period of withdrawal where I was moody and mad at everyone.”

**Continued Use Despite Consequences.** Participants described that they would continue to engage in behaviors that would negatively affect them emotionally, mentally, or physically. One participant said, “Whenever I know I’m eating more than normal that definitely has emotional consequences, but I do it anyways.” Another participant said, “As I’m eating it I’m like I shouldn’t be eating this, it’s not making me feel good, and I’m not getting anything out of it, but I continue to eat it anyway.” Participants described physical side effects, for example “You just feel so bad about yourself and you wake up the next day and you’re so bloated, but it doesn’t stop me from doing it again.” A few participants described that they had food intolerances but choose to continue to eat foods they shouldn’t. One participant said, “I am actually lactose intolerant, but I can’t quit eating cheese, it’s just ridiculous for me to do so, so I even go through the pain of that just so I can have cheese and other dairy products.” Another participant with Celiac’s disease continued eating gluten despite its effects on her mental health, saying “With me I get like severe depression from gluten, and I can’t talk to anyone and I get angry and irritated but I still eat it anyway.”

**Themes: Ideal Relationship with Food**

Participants were asked to describe what their ideal relationship with food would look like, with three themes emerging.

**Less Thinking About It.** Most participants discussed the mental burden they feel from their food addiction and expressed a desire to spend less time thinking about food every day. Participants felt that they did not understand their body’s hunger cues and wanted to understand better when they need to eat. One participant said “I wish I didn’t think about it all the time. Because I don’t think that’s normal and I think the only reason I think about food all the time is that most of my internal conversations are like whether
I'm hungry, whether I've already eaten too much, whether I haven't eaten enough, and I legitimately don't know what my body wants, when it wants it, and I think about it all the time and I don't think that's normal.” Another participant said, “I don't want it to consume my life, I want it to be there as part of it, but I don't want to think about it constantly.” Some participants had difficulty imagining the possibility that they could achieve this, for example “If I didn't have to eat I wouldn’t. It's a frustration to deal with food. I enjoy the taste, I enjoy the social aspect, I enjoy the preparing of meals, but it would make life easier if I didn’t have to. It would be one less thing to manage, one less thing to worry about, one less thing to keep me up at night.” Participants also expressed the desire to be less mentally hard on themselves. One participant said “I want to kind of take back that relationship I never really got to have because I love making meals for my friends and seeing how they enjoy them but I wish I could just sit down and eat one of those meals I make for me and my friends and not feel so guilty about it afterwards.” Another participant said “I want to it be the opposite of what it is now. I don't want to feel guilty when I eat like even when I absolutely need to eat like when I’m hungry, I feel guilty. I don’t want to feel guilty when I do have to eat for my own health.”

**Moderation.** Participants expressed that they either ate too little or too much of food, or that they generally lack portion control. One participant said “Stability. I would like for it to be stable where I can say ‘okay I would like to be in moderation’ like we are supposed to and not cut things off, I want to feel okay having something every once in a while, but it’s having the control to do that.”

**Feeling Healthy.** Participants described just wanting to feel good about their bodies and themselves. They desired to view food as something that supports their bodies and overall health, and not to be used as a coping mechanism, for example “I'd like to feed myself in a way that supports my overall goals and not just how I feel in the moment.”

Table 8. Summary of Themes from Perceptions of Food Addiction, Experience of Psychosocial Symptoms, and Ideal Relationship with Food.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Theme(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of Food Addiction</td>
<td>Similarities to Other Addictions (n=14)</td>
<td>Participants compared food addiction to other addictions, saying that it’s neurologically, biologically, and emotionally the same. Some felt food addiction is worse because food is everywhere and needed to survive.</td>
</tr>
<tr>
<td></td>
<td>Mental Preoccupation (n=11)</td>
<td>Participants felt that the mental burden of food addiction was just as significant as its behavioral problems. They described their addiction as the constant thoughts around food that was time-consuming and distressing.</td>
</tr>
<tr>
<td><strong>Emotion Regulation and Coping Mechanisms</strong> (n=9)</td>
<td>Participants described food addiction as using food as a coping mechanism to deal with stress or mental health and as a way to regulate emotions.</td>
<td></td>
</tr>
<tr>
<td><strong>Similarities to Eating Disorders</strong> (n=8)</td>
<td>Some participants felt that food addiction is similar to binge eating disorders.</td>
<td></td>
</tr>
<tr>
<td><strong>Lack of Control</strong> (n=6)</td>
<td>Participants described food addiction being an issue with self-control.</td>
<td></td>
</tr>
<tr>
<td><strong>Experience of Psychosocial Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interference with Daily Life</strong> (n=36)</td>
<td>Each participant had a description of the way’s food addiction has interfered with their life on a daily basis. Participants described negative impacts on their relationships, social life, professional life, and self-image. They often skipped important social or work events out of fear of their behavior around food.</td>
<td></td>
</tr>
<tr>
<td><strong>Mental Preoccupation</strong> (n=25)</td>
<td>Many participants described that they are constantly thinking about food each day, which impacted their mood and productivity. This involved thinking about their next meal, guilt over what they ate, and worry about how it impacted their body.</td>
<td></td>
</tr>
<tr>
<td><strong>Using Food to Cope With Emotions</strong> (n=22)</td>
<td>Participants described turning to food as a coping mechanism for negative emotions and stress. They also described that they knew it wouldn’t make them feel better but they continued to do it anyway.</td>
<td></td>
</tr>
<tr>
<td><strong>Strong Cravings</strong> (n=16)</td>
<td>Participants described feeling strong cravings that were impossible to ignore until they gave in. They described intrusive thoughts that they could not get rid of.</td>
<td></td>
</tr>
<tr>
<td><strong>Tolerance and Withdrawal</strong> (n=11)</td>
<td>Participants noticed that they had to increase the amount of foods they ate in order to achieve the same emotional or physical satisfaction. Other participants described noticing withdrawal symptoms when they abstained from certain foods.</td>
<td></td>
</tr>
</tbody>
</table>
Continued Use Despite Consequences (n=9)

Participants described that they often had negative emotional or physical reactions to their eating behaviors but found themselves unable to stop. This also included participants with food intolerances who would continue to eat those foods.

Ideal Relationship with Food

Less Thinking About It (n=17)

Nearly all participants expressed a desire to spend less time thinking about food along with the negative emotions associated with it. They wanted to understand when their body was hungry and respond accordingly without thinking too much about it.

Moderation (n=9)

Participants expressed a desire to be able to eat in moderation, without cutting out certain foods, and to have consistent eating habits.

Feeling Healthy (n=10)

Participants wanted to be able to eat to fuel their bodies and support their health, rather than viewing food as a coping mechanism.

Discussion

The aim of this study was to investigate the psychosocial characteristics of college-attending young adults with food addiction. Individuals with food addiction showed significantly higher depression, anxiety, stress, ACEs, and PTSD symptoms, than those without food addiction, as well as lower social support. Individuals with food addiction displayed higher use of avoidant coping and emotion-focused coping, and lower use of problem-focused coping. When examining emotion regulation strategies, individuals with food addiction showed greater difficulty with all six subscales than those without food addiction, and the greatest difficulty with goal setting, non-acceptance of emotions, and strategies.

The psychosocial characteristics of food addiction have not been widely examined in the non-clinical population. Meule et al found higher impulsivity in young adults with food addiction, similar to our results. Within the clinical population, the results have been similar to those found here. Imperatori et al and Mason et al found higher rates of childhood trauma in clinical populations of individuals with food addiction, and Mason et al also found higher rates of PTSD. Hardy et al found higher impulsivity and higher non-acceptance of emotional responses, poor impulse control, and a lack of emotional clarity, also consistent with our results. These
comorbidities are seen within the substance use disorder population\textsuperscript{25}, providing evidence of the similar psychosocial burdens individuals with food addiction and drug addiction face.

Qualitative findings provided more information about the experience of psychosocial symptoms faced by individuals with food addiction. When asked about their perceptions of food addiction, many participants compared it to other addictions, stating that it has the same neurological and behavioral effects, which is still being debated in the literature, but there is substantial evidence supporting this.\textsuperscript{27} Further, some stated that food addiction is worse because food is an integral part of social relationships, is available everywhere, and is necessary to survive, whereas drugs are not needed to survive, and are not as widely available as food. Given that food is introduced more frequently and earlier in life than addictive drugs, the risk of using food as a coping mechanism can be higher.\textsuperscript{7} Participants also felt that food addiction was an issue with mental preoccupation with food, saying that it could either be constantly thinking about what to eat, guilt over what was eaten, or constant thinking about controlling intake. Participants also described food addiction as a coping mechanism and emotion regulation strategy. This was reflected when asked about their experience of symptoms, where the majority of participants described using food to cope with their negative emotions.

Participant descriptions of their symptoms of food addiction were largely focused on how it impacted their daily life, with disruptions in social life, professional life, relationships, and body image. This is consistent with decades of research on the psychosocial implications of substance use, which established the social and interpersonal problems, shame, and stigma that individuals with substance use disorder face\textsuperscript{113}. Our findings align with a qualitative study on individuals with food addiction by Paterson et al\textsuperscript{29}, where one of the themes was impact of weight, in which participants described it causing them to have a negative self-image and significant distress. Participants in this and other studies seem to be more distressed about the impact of their food addiction behaviors on their weight, rather than about the behavior itself.\textsuperscript{29,70} This aligns with the substance use disorder perspective, for example, a tobacco user is not distressed about the act of smoking, but about the impacts of smoking on health.\textsuperscript{29} Therefore, the distress over weight and body image is a potential cognition to target when developing treatment strategies for food addiction. Participants also described a mental preoccupation with food, which is consistent with other qualitative studies\textsuperscript{29,114}, where themes such as persistent cognitions emerged. The use of food to cope with emotions was a significant theme in this study, consistent with other findings, where emotional eating was a causal factor for food addictive behaviors.\textsuperscript{70} This aligns with the quantitative findings showing those with food addiction had higher use of avoidant coping and emotion-focused coping as well as non-acceptance of emotions. This provides another potential cognition to target for treatment strategies.

There is, understandably, some difficulty in distinguishing between binge eating disorder (BED) and food addiction. Disentangling the differences between these two constructs is ongoing.\textsuperscript{46} The similarities between the two disorders are loss of control over consumption, continued use despite negative consequences, and repeated failed
attempts to reduce consumption. There are important distinctions between the two, however. BED is associated with elevated concerns over one's own body shape or weight, binge eating episodes must occur during a discrete period of time, and symptoms of food addiction include withdrawal and tolerance. The difference between these two disorders is further evidenced by a systematic review finding an overall prevalence of food addiction in BED patients ranges from 42 to 57%, suggesting that these two constructs do not completely overlap. It is suggested that food addiction can be a more severe subtype of BED and other eating disorders. Most interview participants in this study displayed high scores on the eating disorder symptom scale, and their description of symptoms did align with BED symptoms, as well as with other eating disorders. The descriptions of strong cravings and feelings of addiction in this study add more evidence to the difference between food addiction and other eating disorders. A qualitative study by Malika et al found similar results, where participants described feeling a compulsive need to have foods they craved readily accessible and would go out of their way to obtain those foods if they did not have them available. Descriptions of tolerance and withdrawal within the present study were significant enough to merge as a theme but were not as common as the other symptoms. These symptoms are a key component for distinguishing between food addiction and other eating disorders and for contributing to the substance use disorder framework applied to food addiction. Other studies have found that tolerance and withdrawal are less commonly described, but this may be attributed to participants misunderstanding these terms, which warrants further investigation.

The description of participant symptoms provides further understanding beyond quantitative measures of these symptoms measured by the YFAS. Participant responses demonstrate the significant mental and emotional burden they face due to their food addiction, which aligns with the quantitative results showing higher mental health disorders, and less problem-focused coping mechanisms and emotion regulation. When asked about their ideal relationship with food, most participants expressed a desire to spend less time thinking about it. This again provides clarity on how significant of a mental burden food addiction can be and provides insight into what may need addressed in treatment or public health interventions. Participants also expressed a desire to be able to practice moderation. Incorporating these into treatment may require a multidisciplinary approach through a team of behavioral health specialists and dietitians.

There is skepticism by some researchers about the validity of food addiction, with concerns that it is not a true addiction, or does not have the capacity to hinder quality of life. Listening and understanding those who face this issue is needed. Individuals with food addiction have faced significantly worse mental health symptoms, unhealthy coping styles, and emotion regulation difficulties, demonstrated by quantitative results. Qualitative results demonstrated the significant psychosocial burdens experienced by individuals with food addiction. Combined, these results make it clear that individuals who suffer from food addiction struggle each day with their self-image, social, professional, and personal life, which negatively contributes to their mental health and well-being.
This study has several limitations. The use of cross-sectional data from one university cannot be generalized to the entire college-attending young adult population. Participants in this study were primarily female, and more investigation into food addiction in males is needed. This study also has several strengths. To our knowledge, the comprehensive examination of many psychosocial characteristics in the non-clinical population is one of the first in the field. There is a lack of qualitative analysis in both the clinical and non-clinical population, and this study contributes to a significant need to further understand the symptoms of food addiction. The use of mixed-methods allowed for a deeper analysis of the psychosocial aspects of food addiction.

Conclusion

College-attending young adults with food addiction face significant mental, emotional, and social distress. Understanding the symptoms of food addiction is necessary for improving treatment and establishing validity of the construct of food addiction. This study contributes important findings by broadening understanding of the realities of food addiction and provides evidence, both quantitatively and qualitatively, for the significance of this problem. In sum, these findings, suggest the urgent need for effective treatments, which likely require a multidisciplinary approach to target unhealthy cognitions towards food and underlying causes.
Chapter VI: Diet Quality and Eating Behaviors of College-Attending Young Adults with Food Addiction
ABSTRACT

Background: Food addiction is a construct in health research that has gained increasing attention but is still not fully understood. There are few investigations into the diet quality and eating behaviors among individuals with food addiction, particularly in the non-clinical population. College students are heavily influenced by their food environment and are an important population in which to study food addiction in.

Methods: Students attending a large university in Appalachia in fall 2021 were invited to complete an online survey that measured food addiction, eating styles, eating disorder symptoms, diet quality, and anticipated feelings after eating food. Kruskal-Wallis H was used to determine differences between those with and without food addiction in mean scores of quantitative variables. Participants who met the criteria for a food addiction diagnosis were invited to participate in an interview that elaborated more on their eating behaviors and feelings about food. Data was thematically analyzed. All quantitative data was analyzed using JMP Pro Version 16.0 and all qualitative data was analyzed using NVIVO Pro Software Version 12.0.

Results: Respondents (n=1645) had a 21.9% prevalence of food addiction, with 5.7% having mild, 4.7% having moderate, and 11.5% having severe. Individuals with mild food addiction had the highest scores in cognitive restraint, while those with severe food addiction had the highest scores in uncontrolled eating, emotional eating, and eating disorder symptoms (p<.01 for all). Individuals with food addiction showed significantly higher negative expectancies for both healthy and junk food (p<.01 for both). Individuals with food addiction showed a significantly lower intake of vegetables (p = .02) and higher intakes of added sugars (p<.01) and saturated fat (p<.01). This was reflected in interview data where participants stated they had problems with sweets, carbs, and processed/fast foods most often. Participants also described eating until physically ill, cycles of restricting and binging, eating in response to negative emotions, dissociation while eating, and strong negative feelings after eating.

Conclusion: These results provide insight into the diet quality, eating behaviors, and thoughts surrounding food among individuals with food addiction. Additionally, differences between these aspects and among different levels of food addiction were elucidated. Findings contribute to the understanding of the behaviors, emotions, and perceptions surrounding food by this population, providing potential behaviors and cognitions to target for treatment.
Introduction

Food addiction is an emerging area of obesity and health research, defined as “a chronic and relapsing condition caused by the interaction of many complex variables that increase cravings for certain specific foods in order to achieve a state of high pleasure, energy, or excitement, or to relieve negative emotional or physical states”\textsuperscript{5}. Attention to food addiction increased due to the continually high rates of obesity despite decades of research on treatment\textsuperscript{2} as well as the ever-increasing access to hyper-palatable foods\textsuperscript{7}. Food addiction has been developed to mirror the features of substance use disorder (SUD)\textsuperscript{29}, in that certain foods can have addictive properties when they contain high amounts of fat, sugar, or salt\textsuperscript{7}. Investigations into the food addiction population thus far have largely focused on their mental and emotional characteristics, finding similarities to SUD, such as experiences of childhood trauma\textsuperscript{12,16}, increased impulsivity\textsuperscript{25,35}, and emotion regulation difficulties\textsuperscript{25}. While these findings are important contributions to the understanding of this phenomenon, more research is needed on the actual eating behaviors of individuals with food addiction. There is debate if food addiction manifests due to the addictive properties of food, mirroring SUD, or if it is more similar to a behavioral disorder, where the cognitive and behavioral factors are addictive\textsuperscript{29}. Understanding the eating behaviors of individuals with food addiction can further clarify this phenomenon.

Of the few studies that have examined this thus far, individuals with food addiction have shown a higher intake of protein and fat\textsuperscript{2}, greater positive and negative anticipated feelings after intake of highly processed food, greater negative anticipated feelings after intake of minimally processed food\textsuperscript{24}, and engagement in emotional eating\textsuperscript{70}. Overall, there is little known about the eating behaviors of the population with food addiction. Eating behaviors include eating styles, which include emotional eating (eating in response to negative or positive emotional states)\textsuperscript{17}, cognitive restraint (deliberate attempts to control intake)\textsuperscript{115} and uncontrolled eating (inability to refrain from eating)\textsuperscript{115}. Determining an individual’s eating style has important clinical implications in treatment and prevention methods\textsuperscript{116}. More investigations are needed into these eating behaviors, specifically among at-risk populations. College-attending young adults are at a formative life stage characterized by irregular lifestyles\textsuperscript{59} and widespread availability of hyper-palatable foods\textsuperscript{8}. They are heavily influenced by their food environment\textsuperscript{8} and their unique personal and social environment can influence eating behaviors\textsuperscript{74}. Food addiction in the general population has been found to be highest in the young adult age group\textsuperscript{34}, and college-attending young adults can be at risk of developing food addiction as a maladaptive coping mechanism to the stressful college environment. Therefore, the present study aimed to examine the dietary quality and eating behaviors of college-attending young adults using a mixed-methods approach to fully capture these characteristics.

Methods

Study Design

This mixed-methods study used a sequential explanatory analysis approach in which quantitative data is collected first, analyzed, and then used to collect qualitative
data to contribute to explanation of findings from the quantitative study. To achieve this, a cross-sectional study was first conducted to examine a sample of young adults attending a large, Appalachian university in fall 2021. Participants were currently enrolled college students. Following quantitative analysis, participants with food addiction were invited to complete in the qualitative portion of semi-structured open-ended interviews to elucidate other causes or contributing factors to their development of food addiction. All subjects gave their written informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Institutional Review Board at West Virginia University (#2106344268).

**Participants and Procedures**

A convenience sample of undergraduate and graduate students attending a large, land-grant university in central Appalachia was recruited during the fall 2021 semester. A list of emails of all active and registered students during the fall 2021 semester was obtained and students were emailed an invitation to participate that included a link the Qualtrics, an online survey platform (Qualtrics, Provo, UT, USA). Participants were instructed to read the informed consent and if they agreed to participate, they proceeded to complete the survey. Students who declined to participate were thanked for their time and were exited from the survey. The time to complete the survey was approximately 35 minutes. After completing the survey, students were informed that the primary outcome of the study was food addiction and were asked if they would be willing to be contacted again to participate in an interview if they are diagnosed with food addiction based on their responses. If they agreed, they provided their email for future contact. Students were incentivized to complete the survey by a chance to win one of three $100 American Express gift cards by entering their contact information following survey completion.

**Quantitative Approach**

**Survey Design**

This 97-item survey was developed by the Lifestyle Intervention Research Lab at WVU using validated tools to investigate a breadth of psychosocial and behavioral characteristics of college-attending young adults. The variables utilized in this study were food addiction using the Yale Food Addiction Scale 2.0 (YFAS 2.0), the Three Factor Eating Questionnaire (TFEQ), eating disorder symptoms using the Eating Disorder Examination Questionnaire-Short Form, diet quality using the Shortened Healthy Eating Index (sHEI), and anticipated effects of food using the Anticipated Effects of Food Scale (AEFS).

**Independent Variable**

**Food Addiction** (Cronbach’s α = 0.94): Food addiction was measured using the YFAS 2.0, a 35-item validated tool used to diagnose food addiction. It was designed to reflect the diagnostic criteria for substance use disorder in the DSM-5. The YFAS 2.0
measures symptoms of food addiction, such as “I spent a lot of time eating certain foods throughout the day” or “I avoided work, school, or social activities because I was afraid I would overeat there”. Scores can be computed using a symptom count, in which responses to certain items are used to assess the presence of symptoms such as “persistent desire or repeated unsuccessful attempts to quit” or “continued use despite social or interpersonal problems”. There is a total of 12 possible symptoms. The other method of scoring is using the diagnostic criteria, in which symptom totals are counted. Importantly, the presence of clinically significant impairment or distress is necessary to be diagnosed with food addiction. Using this method, individuals are designated as having no food addiction (1 or fewer symptoms and/or no clinical significance), mild food addiction (2 or 3 symptoms and clinical significance), moderate food addiction (4 or 5 symptoms and clinical significance), or severe food addiction (6 or more symptoms and clinical significance).

**Dependent Variables**

**Eating Styles (Cronbach’s α = 0.87):** The TFEQ is an 18-item tool measures eating behavior. Items include statements such as “When I feel anxious, I find myself eating”, “Sometimes when I start eating, I just can’t seem to stop”, and “I do not eat some foods because they make me fat” with response options of “Definitely true”, “Mostly true”, “Mostly false”, and “Definitely false”. Responses are broken down into subscales of cognitive restraint, emotional eating, and uncontrolled eating (disinhibition).

**Eating Disorder Symptoms (Cronbach’s α = 0.90):** The EDE-QS is a scale that contains 12 items that measure the presence of eating disorder symptoms over the previous 7 days. Responses are summed and scored from 0 to 36, with higher scores indicating presence of more symptoms.

**Diet Quality (Cronbach’s α = 0.70):** The sHEI is a tool that measures diet quality and is an abbreviated version of prior methods used to assess diet intake. It contains 22 questions on the frequency of consumption of various food groups and scores are computed to reflect the total average intake of each food group. For this analysis, questions on consumption of daily servings of fruits, vegetables, whole grains, sugar-sweetened beverages, added sugars, saturated fat, and water were utilized.

**Anticipated Effects of Food (Cronbach’s α = 0.93):** The AEFS is a scale that contains 2 questions that measure 31 emotions on anticipated feelings after intake of healthy or junk food. The scale asks respondents to indicate the likelihood (such as definitely not, probably, or definitely) that they will experience feelings such as shame, happiness, frustration, deprivation, or worry after eating junk food following by the same question and anticipated feelings for healthy food.

**Statistical Analysis**

Descriptive statistics were computed for all above variables. This included frequencies for categorical variables and means and standard deviations for continuous variables. Skewness and kurtosis were checked for normal distribution. If distributions were not normal, transformations were conducted to try to correct it. Participants were
categorized as having no, mild, moderate, or severe food addiction based on YFAS 2.0 scoring criteria. Eating style and food expectancy variables were left continuous for analysis. To examine differences in mean scores of various psychosocial variables among different levels of food addiction, One-Way ANOVA was used. Levene’s test was conducted to check for homogeneity of variance. Since criteria for homogeneity of variance was not met, Kruskal-Wallis was used in place of One-Way ANOVA. Steel with control was conducted to compare individuals with no food addiction to individuals with severe food addiction. Dietary data was left categorical for analysis. Chi-square analysis was conducted to detect significant differences in daily servings of different food groups between those with no, mild, moderate, and severe food addiction.

Qualitative

*Development of Interview Questions*

Interview questions were developed by the Lifestyle Intervention Research Lab at WVU. The questionnaire followed a semi-structured, open-ended question format. Questions were generated based on aspects of the survey that needed further exploration. The entire questionnaire contained 13 questions with 9 probes and questions were organized by topic. The questions analyzed for this study were under the topics of “Current Eating Behaviors”, “Reasons for Eating Certain Foods”, “Feelings While Eating Certain Foods”, and “Feelings After Eating Certain Foods”. Questions asked for these topics are summarized below.

**Table 1. Topics and questions used for thematic analysis.**

<table>
<thead>
<tr>
<th>Topic(s)</th>
<th>Question(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Eating Behaviors</td>
<td>1. I’m going to read some of the symptoms of food addiction to you and you can tell me whether or not you have experienced these symptoms and describe them if so.</td>
</tr>
<tr>
<td></td>
<td>a. Eating when no longer hungry or until physically ill</td>
</tr>
<tr>
<td></td>
<td>b. Persistent desire or repeated unsuccessful attempts to quit</td>
</tr>
<tr>
<td></td>
<td>c. Continuing to eat certain foods despite emotional or physical consequences</td>
</tr>
<tr>
<td></td>
<td>d. Using foods to feel better</td>
</tr>
<tr>
<td>Reasons for Eating Certain Foods</td>
<td>1. Please describe which feelings or situations you feel cause you to want to eat certain foods.</td>
</tr>
<tr>
<td></td>
<td>2. Can you describe what it is about these foods that make you want to eat them?</td>
</tr>
<tr>
<td>Feelings While Eating Certain Foods</td>
<td>2. Please describe how you feel during and after engaging in eating certain foods.</td>
</tr>
<tr>
<td>Feelings After Eating Certain Foods</td>
<td></td>
</tr>
</tbody>
</table>
Participants and Conducting of Interviews

Participants who had a diagnosis of food addiction from their survey responses and who indicated they would be willing to be contacted to participate in another interview were emailed the invitation to participate and schedule an interview via Zoom, a virtual meeting platform. Individuals who agreed to participate signed additional consent before completing the interview. Interviews were audio recorded for transcription purposes.

Data Analysis

Thematic analysis, which is gleaning major themes and subthemes from qualitative data, was used to analyze data. Interviews were transcribed verbatim from the audio recordings by the first author (RAW). All interviews were reviewed multiple times before coding began (RAW). To code data, responses to the questions under the topic Current Eating Behaviors, Reasons for Eating Certain Foods, Feelings While Eating Certain Foods, and Feelings After Eating Certain Foods, were reviewed and codes were assigned to responses that had similar qualities (RAW). Codes were based on subjective assessment. After coding all transcripts, the codes were reviewed, and additional codes were added if deemed necessary (RAW). Similar codes were grouped together to generate themes and subthemes. Review of themes and subthemes then occurred and necessary changes were made. A secondary reviewer (MDO) reviewed all themes and subthemes and agreement was reached between both reviewers to generate a final list of themes and subthemes. All themes and subthemes were described and example quotes illustrating the theme were chosen based off which best encapsulated the theme.

Results

Respondents (n=1645) were primarily female (76.2%), identified as women (73.5%), White/Caucasian (84.4%), and were in graduate/professional school (27.0%). The mean age of respondents was 22.03 ± 5.15. There was a 21.9% prevalence of food addiction, with 5.7% of that being mild, 4.7% being moderate, and 11.5% being severe.

Table 2. Demographics of Respondents.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>400 (23.8%)</td>
</tr>
<tr>
<td>Female</td>
<td>1280 (76.2%)</td>
</tr>
<tr>
<td>Gender Identity</td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>391 (23.3%)</td>
</tr>
<tr>
<td>Woman</td>
<td>1235 (73.5%)</td>
</tr>
<tr>
<td>Nonbinary</td>
<td>46 (2.7%)</td>
</tr>
<tr>
<td>Other/Self-describe</td>
<td>8 (0.5%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
</tbody>
</table>
Demographic data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables.

There were significant differences in each eating style subscale between each level of food addiction. Individuals with mild food addiction had the highest scores in cognitive restraint (16.74 ± 0.50) compared to individuals with no, moderate, and severe food addiction, and this relationship was significant (p<.01). Individuals with severe food addiction had the highest scores in uncontrolled eating (26.70 ± 0.43) as well as emotional eating (9.62 ± 0.19) and both of these were significant (p<.01 for both). Steel with control showed no significant differences between no food addiction and severe food addiction in cognitive restraint (p=.38) as well as no significant differences between no food addiction and mild food addiction in uncontrolled eating (p=.09) and emotional eating (p=.54). Individuals with food addiction also had higher eating disorder symptoms (p<.01), with steel with control showing significant differences between no food addiction and each level of food addiction (p<.01 for all). Table 3 displays results from this analysis.

Table 3. Differences in Eating Styles and Eating Disorder Symptoms Among Different Levels of Food Addiction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>P-Value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cognitive Restraint</td>
<td>14.14 ± 0.13 (13.89, 14.40)</td>
<td>16.74 ± 0.50 (15.77, 17.72)</td>
<td>15.61 ± 0.50 (14.62, 16.60)</td>
</tr>
<tr>
<td></td>
<td>None vs Mild: &lt;.01*</td>
<td>None vs Moderate: .02*</td>
<td>None vs Severe: .38</td>
</tr>
</tbody>
</table>
Kruskal-Wallis results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at p < .05. Scores for cognitive restraint are out of a total of 24, scores for uncontrolled eating were out of a total of 36, and scores for emotional eating were out of a total of 12. Scores for eating disorder symptoms are out of a possible 36.

When examining expected feelings from food, there were significant differences in negative expectancies for both healthy and junk food among different levels of food addiction. Individuals with severe food addiction had the highest scores on negative expectancies for both junk food (3.88 ± 0.08) and healthy food (2.04 ± 0.05) and both of these relationships were significant (p<.01 for both). Steel with control showed a significant difference between no food addiction and mild, moderate, and severe food addiction for negative expectancies for junk food (p<.01 for all). Steel with control also showed significant differences between no food addiction and mild food addiction, moderate food addiction, and severe food addiction (p<.01 for all) for negative expectancies for healthy food, demonstrating the most significant difference between none and severe food addiction. Table 4 displays results from this analysis.

Table 4. Differences in Food Expectancies Among Different Levels of Food Addiction.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>P-Value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Positive Expectancies - Junk Food</td>
<td>2.52 ±</td>
<td>2.56 ±</td>
<td>2.61 ±</td>
</tr>
<tr>
<td></td>
<td>0.024</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(2.47, 2.57)</td>
<td>(2.38, 2.75)</td>
<td>(2.43, 2.80)</td>
</tr>
</tbody>
</table>
Kruskal-Wallis results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at p < .05. Scores for each variable were out of 6.

Analysis of daily food group consumption showed several significant differences between each level of food addiction. Individuals with severe food addiction had lower daily consumption of vegetables (p = .02) and significantly higher consumption of added sugars (p<.01) and saturated fat (p<.01). Results from this analysis are displayed in Table 5.

Table 5. Differences in Servings of Food Groups Among Different Levels of Food Addiction.
<table>
<thead>
<tr>
<th>Vegetables</th>
<th>&lt;1 Serving</th>
<th>1 Serving</th>
<th>2 Servings</th>
<th>3 Servings</th>
<th>4 Servings</th>
<th>5 Servings</th>
<th>6 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 Serving</td>
<td>159 (14.5%)</td>
<td>15 (20.8%)</td>
<td>19 (26.8%)</td>
<td>36 (22.4%)</td>
<td>.02*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Serving</td>
<td>260 (23.8%)</td>
<td>26 (36.1%)</td>
<td>18 (25.4%)</td>
<td>44 (27.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Servings</td>
<td>330 (30.2%)</td>
<td>12 (16.7%)</td>
<td>15 (21.1%)</td>
<td>34 (21.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Servings</td>
<td>202 (18.5%)</td>
<td>12 (16.7%)</td>
<td>16 (22.5%)</td>
<td>27 (16.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Servings</td>
<td>99 (9.1%)</td>
<td>5 (6.9%)</td>
<td>2 (2.8%)</td>
<td>15 (9.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Servings</td>
<td>25 (2.3%)</td>
<td>1 (1.4%)</td>
<td>0 (0.0%)</td>
<td>4 (2.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td>19 (1.7%)</td>
<td>1 (1.4%)</td>
<td>1 (1.4%)</td>
<td>1 (0.6%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Whole Grains</th>
<th>&lt;1 Serving</th>
<th>1 Serving</th>
<th>2 Servings</th>
<th>3 Servings</th>
<th>4 Servings</th>
<th>5 Servings</th>
<th>6 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 Serving</td>
<td>320 (29.4%)</td>
<td>29 (40.3%)</td>
<td>30 (42.3%)</td>
<td>46 (28.6%)</td>
<td>.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Serving</td>
<td>271 (24.9%)</td>
<td>20 (27.8%)</td>
<td>17 (23.9%)</td>
<td>43 (26.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Servings</td>
<td>283 (26.0%)</td>
<td>10 (13.9%)</td>
<td>14 (19.7%)</td>
<td>39 (24.2%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Servings</td>
<td>135 (16.7%)</td>
<td>12 (16.7%)</td>
<td>6 (8.5%)</td>
<td>20 (12.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Servings</td>
<td>57 (5.2%)</td>
<td>0 (0.0%)</td>
<td>2 (2.8%)</td>
<td>6 (3.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Servings</td>
<td>14 (1.3%)</td>
<td>1 (1.4%)</td>
<td>1 (1.4%)</td>
<td>3 (1.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 or more</td>
<td>9 (0.8%)</td>
<td>0 (0.0%)</td>
<td>1 (1.4%)</td>
<td>4 (2.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sugar-Sweetened Beverages</th>
<th>&lt;1 Beverage</th>
<th>1 Beverage</th>
<th>2 Beverages</th>
<th>3 Beverages</th>
<th>4 Beverages</th>
<th>5 Beverages</th>
<th>6 Beverages</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 Beverage</td>
<td>486 (44.8%)</td>
<td>34 (47.2%)</td>
<td>35 (50.0%)</td>
<td>61 (37.9%)</td>
<td>.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Beverage</td>
<td>289 (26.6%)</td>
<td>17 (23.6%)</td>
<td>15 (21.4%)</td>
<td>34 (21.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Beverages</td>
<td>175 (16.1%)</td>
<td>13 (18.1%)</td>
<td>13 (18.6%)</td>
<td>33 (20.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Beverages</td>
<td>82 (7.6%)</td>
<td>6 (8.3%)</td>
<td>5 (7.1%)</td>
<td>16 (9.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Beverages</td>
<td>31 (2.9%)</td>
<td>1 (1.4%)</td>
<td>2 (2.9%)</td>
<td>6 (3.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Beverages</td>
<td>14 (1.3%)</td>
<td>1 (1.4%)</td>
<td>0 (0.0%)</td>
<td>5 (3.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Beverages</td>
<td>9 (0.7%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>6 (3.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Added Sugar</th>
<th>None/Almost None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Almost None</td>
<td>150 (13.9%)</td>
<td>11 (15.3%)</td>
<td>6 (8.5%)</td>
</tr>
<tr>
<td>Some</td>
<td>683 (63.5%)</td>
<td>39 (54.2%)</td>
<td>37 (52.1%)</td>
</tr>
<tr>
<td>A Lot</td>
<td>243 (22.6%)</td>
<td>22 (30.6%)</td>
<td>28 (39.4%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saturated Fat</th>
<th>None/Almost None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Almost None</td>
<td>232 (21.5%)</td>
<td>16 (22.2%)</td>
<td>14 (20.0%)</td>
</tr>
<tr>
<td>Some</td>
<td>703 (65.3%)</td>
<td>42 (58.3%)</td>
<td>38 (54.3%)</td>
</tr>
<tr>
<td>A Lot</td>
<td>142 (13.2%)</td>
<td>14 (19.4%)</td>
<td>18 (25.7%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th>None/Almost None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>None/Almost None</td>
<td>37 (3.4%)</td>
<td>2 (2.8%)</td>
<td>4 (5.6%)</td>
</tr>
<tr>
<td>Some</td>
<td>347 (32.0%)</td>
<td>27 (37.5%)</td>
<td>25 (35.2%)</td>
</tr>
<tr>
<td>A Lot</td>
<td>701 (64.6%)</td>
<td>43 (59.7%)</td>
<td>42 (59.2%)</td>
</tr>
</tbody>
</table>

Results from Chi-Square analysis of differences in daily servings of food group consumption between individuals with no, mild, moderate, and severe food addiction. P-value represents significance (p ≤ .05)

Qualitative

Of the 360 participants in the survey who had a diagnosis of food addiction, 241 agreed to be contacted for an interview. Of the 241 emails sent, 40 responded to schedule an interview time. Four participants did not show up for their interviews, resulting in a final n of 36 interviews being conducted.

Interview Participant Characteristics
Interview participants were mostly diagnosed as having severe food addiction (72.2%), with 11.1% having moderate and 16.7% having mild. The mean number of YFAS symptoms was 6.75 ± 2.71. Most participants were female (80.6%), White (88.9%) and in graduate/professional school (30.6%). The mean age of participants was 22.1 ± 4.63 and the mean BMI was 29.7 ± 8.30, with most (36.1%) falling into the obese category. Interview participant characteristics are reported in Table 6.

Table 6. Distributions of demographic and psychosocial variables of interview participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N)(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Addiction</strong></td>
<td></td>
</tr>
<tr>
<td>Mild (2 or 3 symptoms + clinical significance)</td>
<td>6 (16.7%)</td>
</tr>
<tr>
<td>Moderate (4 or 5 symptoms + clinical significance)</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Severe (6 or more symptoms + clinical significance)</td>
<td>26 (72.2%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7 (19.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>29 (80.6%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>32 (88.9%)</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td>Native American or Alaska Native</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>4 (11.1%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>10 (27.8%)</td>
</tr>
<tr>
<td>Junior</td>
<td>3 (8.3%)</td>
</tr>
<tr>
<td>Senior</td>
<td>8 (22.2%)</td>
</tr>
<tr>
<td>Graduate/Professional School</td>
<td>11 (30.6%)</td>
</tr>
<tr>
<td><strong>BMI Category</strong></td>
<td></td>
</tr>
<tr>
<td>Underweight (&lt;18.5 kg/m²)</td>
<td>2 (5.6%)</td>
</tr>
<tr>
<td>Normal range (18.5 – 24.9 kg/m²)</td>
<td>9 (25.0%)</td>
</tr>
<tr>
<td>Overweight (25.0 – 29.9 kg/m²)</td>
<td>12 (33.3%)</td>
</tr>
<tr>
<td>Obese (&gt;30 kg/m²)</td>
<td>13 (26.1%)</td>
</tr>
<tr>
<td><strong>Variable</strong></td>
<td><strong>Mean ± SD (95% CI)</strong></td>
</tr>
<tr>
<td>YFAS Symptoms</td>
<td>6.75 ± 2.71 (5.83, 7.67)</td>
</tr>
<tr>
<td>Age</td>
<td>22.1 ± 4.63 (20.5, 23.76)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>29.7 ± 8.30 (26.90, 32.51)</td>
</tr>
</tbody>
</table>

Demographic and psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation; BMI, body mass index; YFAS, Yale Food Addiction Scale; CI Confidence Interval.

**Eating Environment and Problem Foods**

When asked about their surrounding environment while engaging in their current eating behaviors, nearly every participant stated that they were most often alone, with most stating they were simultaneously on their phone, watching TV, or doing homework.
Many participants also stated that it most often occurred at night, although some stated that they often ate in large quantities throughout the day. Participants were also asked about their “problem foods”, with the most frequently reported being sweets, followed by fast and processed food, and then carbohydrate foods, especially bread and pasta. Sugar-sweetened beverages were mentioned by a few participants, and some participants stated that they have problems with any type of food, even healthy foods. Figure 1 below displays this.

Figure 1. Interview Participants Responses to Problem Foods.

**Themes: Current Eating Behaviors**

Participants were asked questions about their experience of symptoms, which contained questions related to current eating behaviors. This led to the development of four themes. Themes are summarized in Table 7.

**Eating Until Physically Ill.** Participants described continually eating in amounts that caused severe physical consequences but being unable to stop despite their physical discomfort. Many participants described that it would feel good initially, which would lead them to think that more eating would continue to bring positive feelings. One participant said “I don’t want to lose that moment I’m having of wanting to eat and have it last as long as possible and I feel like I’m ignoring the law of diminishing utility, where I’m just assuming I’m going to get the same amount of joy if I just do more and more and more until it feels like your ribs are cracking. Then it’s no longer good and it hurts but you just keep going because it was something that felt good in the beginning.” Some participant attributed this to feeling the need to finish their plate, for example “I always have to finish my food… If I go to a restaurant, it’s very difficult for me to leave food on a
Other participants felt that they don’t have the ability to tell when their body is full. One participant described this as “I tend to not know when I feel full. I don’t know when my body is telling me when I’m done eating and so I just keep eating until I feel overly full and then it makes me sick.”

Unsuccessful Attempts to Quit. Participants expressed that they would continually make efforts to change their eating habits but would often fail at this. Participants described different approaches to this. For example, one participant said “I thought that it’d be good to cut it out cold turkey, and then I could reintroduce things in moderation, but I started to get really bad thoughts about food and was restricting a lot and ended up bingeing on healthy foods at night. And then that turned back into binging on unhealthy foods so that was an attempt to quit that made it worse.” Participants described cycling between different diets and finding that they often would go back to their old habits, with one participant describing her habits as “chronic dieting, being in a diet cycle constantly.” Many participants felt that the reason they failed at changing their behaviors was because they would restrict too much, leading to almost immediate relapse of behaviors, sometimes finding the behaviors to become worse than before. One participant said, “A lot of times you bounce back to your normal habits if you restrict too much so then you overdo it when you get the chance.”

Cycles of Restricting and Binging. Many participants said that they often deprive themselves during the day and will go very long periods without eating, and then eat in copious amounts at the end of the day. Sometimes not eating was used as punishment for participants’ behaviors. For example, a participant would restrict herself as punishment each day for what she had eaten the previous night, saying “Not eating for 16 to 20 hours is not uncommon for me and then I would binge on enormous amounts of fast food and then not eat for long periods of time again knowing that what I had one was wrong so it was punishment for myself… logically that makes zero sense but in my head it makes perfect sense.” Participants also commonly expressed that they either eat too little or not enough. One participant said “Either I don’t eat a lot or I forget to eat or I eat way too much, there’s no between. I cannot have a healthy amount of food for whatever reason.”

Issues with Control. This theme contained two types of control issues. Some participants felt out of control of their eating constantly. One participant said, “If I make an entire tray of something that could feed an entire family, it doesn’t matter, I am going to eat all of it.” Another participant said “I kind of feel like that kid that just can’t get enough cake, you know, I do feel ashamed when I eat like that and I’m just like ‘you know what, I’m just going to have it because I want it’ and then two hours later I’ll have even more.” Other participants described ways that they control their intake. One participant said, “This is really sad but I actually have an alarm on my phone that would say ‘Don’t eat, you’re too fat.’ It was really mean, it was a really mean alarm, but it was my way of controlling what I was eating and my perception with food.”

Themes: Reasons for Eating Certain Foods
Participants were asked what it was about food that made them want to eat it and what types of feelings caused them to want to eat certain foods. This led to the development of four themes.

**Eating in Response to Negative Emotions.** This theme involved descriptions of participants turning to food when they wanted to feel good or to assuage feelings of anxiety, loneliness, boredom, or sadness. A participant described this as “It’s usually feeling bad… it makes me want to eat my feelings as a way to distract myself because it makes me feel happy in the time-being even though it’s just a very short burst of what I need in the moment.” Participants continually described using food for comfort, with one saying, “I am always alone so it is a comfort thing… food kind of gives me that comfort.” Participants also described that COVID-19 exacerbated their symptoms due to the increased boredom and loneliness they felt. One participant said “The emotional stressors made the lows SO much worse because I would be really isolated and all I could really have was the food. So, if I didn’t have the emotional ability to do well, all I could do was do really bad because I didn’t see a point in stopping because I had nowhere to go.”

**Enjoy the Act of Eating.** Participants described that they enjoy the feeling of being full, enjoyed the texture of food, and enjoyed the taste. One participant said “I think it is the full feeling of them. If I eat enough of them, I feel satisfied to an extent.” Participants described that the act of eating itself provides comfort, not matter what the food is. One participant said, “My interest in food itself is not that it’s specifically this food or that food, it’s just that I want to eat, I want food.” Another participant felt that it was just something to do, saying “I just enjoy the act of eating something, I’m always fidgeting with my hands because I’m anxious so I feel like eating gives me something to do when I’m nervous because I feel like I should be doing something.”

**Ties to Childhood and Positive Memories.** Participants expressed that food would remind them of positive memories growing up or provide stability to them when they felt they did not have it. One participant said, “It’s a sense of security and safety because a lot of the foods I eat were foods I ate when my parents weren’t split up and so it would make me think of a better time.” This was echoed by another participant, saying “My dad makes me a cake every year on my birthday, like those are happy memories, and when I’m feeling really lonely I’m like ‘well this cake is my friend’ so it’s just something where I know there are no bad memories associated with it… it’s something in that moment that’s just mine, it’s just for me.” Participant often expressed that they wanted to feel a sense of being worry-free compared to the stress that they feel now. For example, one participant said “My comfort meal is dinosaur chicken nuggets and macaroni and cheese, and I think that’s childish, not in a bad sense, but in a way that I can be seven again and not have the stresses of adulthood …. Living in a different setting, even just for a second, it’s nice to kind of go back.”

**Restriction Made More Tempting.** Participants described that feeling that foods were forbidden or not allowed made them more likely to want them. This was most often expressed by participants who grew up in a restrictive eating environment, for example one participant who wasn’t allowed to have unhealthy foods said “Now I think I have this mentality of if there’s something that I want I have to eat it. Even if I am not hungry or
don’t actually want it, but I don’t know when I’m going to get it again, so I have to eat it.” Another participant felt this was due to deeming foods as good or bad, saying “Labeling foods bad and good, that’s another thing. Growing up, it was like sugar’s bad, fruit is good, vegetables are healthy so it’s kind of in my head that I want to have bad food.”

Themes: Feelings While Eating Certain Foods

Participants were asked how they felt while they were engaging in their eating behaviors, which created three themes.

**Dissociation.** Participants described “blacking out” or not feeling anything while they were eating. Participants described feeling that they were not the ones who made the decision to eat, but something else takes over, with one saying “I don’t know how else to describe it other than it’s as if something else kind of takes over and is making the decisions instead.” Other participants felt that feeling nothing was the reason they engaged in the behavior, for example “I kind of dissociate in a way and don’t really think about anything which is the underlying goal, to escape from everything.”

**Negative Feelings.** Participants expressed that even while engaging in the behavior, they were not getting any enjoyment and were often telling themselves to stop. One participant described this as “When I’m eating, I feel disgusting. I feel fat, I feel disgusting, I feel like I’m feeding trauma if that makes sense.”

**Initial Happiness.** Participants described that the behavior brought about positive feelings, but usually just for a few moments. One participant said “During the first part, I’m really happy, it’s amazing. It’s more of an emotional experience than food should ever provide.”

Themes: Feelings After Eating Certain Foods

Participants were asked how they usually felt after eating certain foods or eating in general. This developed one theme.

**Negative Feelings.** Every participant stated that they felt poorly, either emotionally or mentally, after eating food. Participants most often expressed guilt and shame. A participant described this as “Afterwards you can be satisfied physically but wildly unsatisfied mentally. Down on yourself, frustrated, angry, depression… you reach for this thing to fix things but rather than solving the problem, it’s prolonging the problem.” Many participants expressed that these negative feelings would last for hours or even days. Participants also reflected on how these negative feelings made them again engage in the behaviors in a cyclical manner, with one saying “The guilt would make me want to eat more because I feel upset about it” and another saying “It leads into the next morning where I decide to start all over again and try to fight this addiction, but I never quite make it through the day so it’s a vicious cycle.”

Table 7. Summary of Themes from Current Eating Behaviors, Reasons for Eating Certain Foods, Feelings While Eating Certain Foods, and Feelings After Eating Certain Foods
<table>
<thead>
<tr>
<th>Topic</th>
<th>Theme(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Eating Behaviors</strong></td>
<td>Eating Until Physically Ill (n=24)</td>
<td>Participants described eating in large quantities until they their stomach hurt or they were sick on a regular basis. This was largely due to wanting to prolong the feeling of happiness initially brought about by eating.</td>
</tr>
<tr>
<td></td>
<td>Unsuccessful Attempts to Quit (n=21)</td>
<td>Participants described going through constant diet cycles in efforts to quit. Often, participants would end up returning to their behaviors at a more severe level than before trying to quit.</td>
</tr>
<tr>
<td></td>
<td>Cycles of Restricting and Binging (n=15)</td>
<td>Participants described going long periods of time without eating, and then bingeing later on in the day. Some participants used restriction as punishment for the amount of food they ate on the previous night.</td>
</tr>
<tr>
<td></td>
<td>Issues with Control (n=15)</td>
<td>Participants had two types of issues with control. Some participants felt that they had no control over the amounts of food they consume on a regular basis, while others would take measures to control their intakes, such as setting alarms on their phone to tell them to not eat.</td>
</tr>
<tr>
<td><strong>Reasons for Eating Certain Foods</strong></td>
<td>Eating in Response to Negative Emotions (n=25)</td>
<td>Participants often turned to food when they felt anxious, sad, lonely, or bored. They described that foods provided comfort for them, even in the short term.</td>
</tr>
<tr>
<td></td>
<td>Enjoy the Act of Eating (n=13)</td>
<td>Participants described that they enjoyed the act of eating itself, either due to the feeling of being full, the texture, or the taste. Some found eating to be a way to distract themselves from their anxious habits.</td>
</tr>
<tr>
<td></td>
<td>Ties to Childhood and Positive Memories (n=12)</td>
<td>Participants would associate eating with previous positive experiences in their life and would seek out foods to remind them of those times. They often ate foods that reminded them of being a child or of a positive family memory growing up.</td>
</tr>
<tr>
<td></td>
<td>Restriction Made More Tempting (n=10)</td>
<td>Participants who grew up in a restrictive eating environment found that they now seek out unhealthy foods because they were deprived of them when younger. They felt that foods that they’re not supposed to eat are more appealing, even now.</td>
</tr>
</tbody>
</table>
Feelings While Eating Certain Foods

<table>
<thead>
<tr>
<th>Dissociation (n=15)</th>
<th>Participants described “blacking out” while eating and feeling that something else took over them. They described feelings of nothingness or blank thoughts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Feelings (n=15)</td>
<td>Participants expressed that they don’t even enjoy eating now and that the whole time, they are feeling poorly about themselves.</td>
</tr>
<tr>
<td>Initial Happiness (n=7)</td>
<td>Participants expressed that usually when they first began eating, they felt happy, but this only lasts for a few moments.</td>
</tr>
</tbody>
</table>

Feelings After Eating Certain Foods

| Negative Feelings (n=36) | Every participant expressed that they felt negatively after every single time they ate something. The most often expressed feelings were guilt and shame, with these feelings lasting hours or even days. Participants also expressed that these negative feelings caused them to turn to food again for comfort in a cyclical manner. |

Discussion

The aim of this study was to determine the diet quality and eating behaviors of college-attending young adults with food addiction. There was a 21.9% prevalence of food addiction, which is higher than some studies, but about the same as other studies within the college population. Analysis showed significant differences in all variables between those with and without food addiction, as well as between levels of severity of food addiction. Quantitative results found that individuals with food addiction had lower cognitive restraint, higher emotional eating, and higher uncontrolled eating. Apart from those with no food addiction, individuals with mild food addiction has the highest scores in cognitive restraint, as well as the lowest scores in emotional eating and uncontrolled eating. These findings show the different eating styles among the different levels of severity of food addiction. Qualitative results mirrored these findings. The themes for current eating behaviors showed that participants commonly ate until physically ill and had control issues, which took the form of controlling intake and feeling out of control. These descriptions align with the lower cognitive restraint scores as well as the higher uncontrolled eating scores. Further, when asked why they ate certain foods, the most prominent theme was eating in response to negative emotions, reflecting the higher scores in emotional eating. This aligns with a previous qualitative study, where participants described emotional eating as the catalyst to their food addiction behaviors.

Individuals with severe food addiction had the highest eating disorder symptoms, consistent with other studies finding high rates of food addiction among those with
eating disorders$^{9,32,33,46}$, and contributing to the perspective that food addiction may be a more severe subtype of eating disorders$^{46}$. This aligns with the current study’s qualitative findings, where participants described cycles of restricting and bingeing. These behaviors are consistent with other eating disorders and show the various ways food addiction can take form. Individuals with food addiction showed significantly higher negative expectancies following intake of both healthy food and junk food, with those with severe food addiction showing the highest scores. These findings are somewhat similar to a study by Cummings et al$^{24}$, where participants with food addiction had higher positive and negative expectancies from anticipation of junk food intake, and higher negative expectancies from anticipation of healthy food intake. Our findings show that individuals with food addiction in this population expected to feel negatively after intake of both healthy food and junk food, which was reflected in qualitative findings. The single theme that developed from the topic of feelings after eating certain foods was negative feelings, where participants largely described feelings of guilt and shame. Further, they described that these negative feelings caused them to turn to food again to comfort themselves, similar to what was found in a study by Paterson et al$^{29}$. The Anticipated Effects of Food Scale (AEFS) used in this study and developed by Cummings et al$^{24}$ was based on Expectancy Theory, which is used in SUD research. Expectancy Theory posits that individuals store information about the outcomes of substance use (or expectancies) that is learned from vicarious or personal experience$^{24}$. Individuals with food addiction in this study had only negative expectancies from food, which is similar to those with SUD, as negative feelings can lead to greater use$^{24}$. These findings align with the SUD framework used to conceptualize food addiction.

Individuals with food addiction showed a significantly lower intake of vegetables and a significantly higher intake of added sugars and saturated fats. There are minimal other investigations into the dietary quality in this population, but Pedram et al found a higher intake of fat$^2$, similar to our results. Qualitative data provided further insight into the diet of individuals with food addiction. Individuals most commonly named sweets as their problem food, aligning with the higher intake of added sugar, followed by fast food and processed foods, aligning with the higher intake of saturated fat. These findings also reflect the SUD framework for food addiction, wherein food addiction is related to the addictive properties of foods containing high amounts of salt, sugar, or fat$^7$. However, other qualitative findings show the behavioral characteristics of food addiction in which individuals struggle. For example, participants described that the reason they engage in food addiction behaviors is because they enjoy the act of eating, rather than enjoying the food itself. Additionally, participants stated that certain foods were tied to positive memories for them, so they consumed them to relive them or feel similar feelings. These findings align with both the SUD framework and behavioral addiction framework, similar to conclusions from another qualitative study, where participants described learned situational and environmental cues to their behaviors$^{29}$.

This study also had other important findings from qualitative analysis. Individuals described dissociation or “blacking out” while eating, which has important treatment implications. Using mindfulness techniques when treating individuals with food addiction may be a potential solution, which has shown promise in treating individuals with obesity$^{120}$. It is also important to screen for and treat any other DSM-5
psychiatric disorders in those presenting with food addiction. For example, those with Depressive Disorders (i.e., Major Depressive Disorder) or Trauma- and Stressor-Related Disorders (i.e., Posttraumatic Stress Disorder), may be using eating as a form of coping/emotional avoidance; thus, adjunctive treatments may be needed. Participants also described their unsuccessful attempts to quit unhealthy patterns/cycles of overeating, which were largely a result of restricting too much, showing which cognitions need to be targeted when treating these individuals. Based on current and existing data, evaluation and treatment of co-occurring eating disorders, particularly binge eating disorder (BED), is critical among those with food addiction.121 Prior research suggests there are reductions in binge eating behaviors from specialized treatments for BED such as cognitive behavioral therapy122 and/or pharmacotherapy.123 Lastly, education on sustainable dietary changes will be crucial in developing treatments for this population.

This study has several limitations. Data was collected from a single university and cannot be generalized to the entire college-attending young adult population. The use of self-reported, cross-sectional data has limitations in causation and reliability. The majority of participants were female, and more investigations into food addiction in the male population are needed. This study also has several strengths. The use of validated tools in quantitative data collection contributes to the validity of findings and allows for consistent comparisons between other studies. To our knowledge, this is the first mixed-methods study to examine diet quality and eating behaviors among individuals with food addiction. The comprehensive topics covered in the interviews provided valuable information for characteristics of this population, potential underlying causes, and treatment implications.

Conclusion

This study enhanced the understanding of the eating behaviors of individuals with food addiction, which has been understudied to date. The differences in eating styles between each level of severity of food addiction has important implications for understanding the different needs of this population. The thoughts and feelings surrounding food as well as reasons for eating these foods provide potential cognitions and behaviors to target when developing treatments. Findings also provide evidence for applying both a substance-based framework and behavior-based framework to the concept of food addiction. The use of mixed-methods provided a richer understanding of these topics.
Chapter VII: Discussion and Conclusion
Discussion

Chapter 7 summarizes the findings within this dissertation and draws comparisons to previous literature. This chapter also makes suggestions for future research to improve upon the findings of this dissertation and further the understanding of food addiction. This dissertation aimed to determine the psychosocial influences on and behavioral characteristics of food addiction in college-attending young adults. Findings from this work have important implications in recognizing the issue of food addiction faced by college students as well as its symptoms and characteristics, providing potential cognitions and behaviors to target when developing treatment. This dissertation utilized a mixed-methods approach, allowing for a deeper understanding of the experience of food addiction.

Summary of Findings

Within this study, there was a 21.9% prevalence of food addiction, similar to findings from other studies in the college-attending population. These findings show that food addiction can be a significant issue on college campuses, pointing to the need for further investigations in this population. In chapter 4, the impacts of ACEs and other early life influences on the development of food addiction in young adults were explored. Based off previous literature where ACEs were a significant predictor of the development of food addiction in the clinical population, it was hypothesized that this relationship would exist in the current study. However, depression was the only significant predictor of the development of food addiction, with each point increase on the depression scale increasing the odds of food addiction by 233%. Depression is a common comorbidity of food addiction and is also associated with a poorer diet quality. Qualitative results provided more context to these findings. Influences on their current eating habits included factors not captured by the ACE questionnaire, such as restrictive eating environments, diet culture, reliance on cheap and processed foods, or positive memories surrounding mealtime. These findings reinforce research showing the important role the parental and familial units play in shaping an individual’s eating habits and aligns with qualitative findings from other studies. Participants also described reliance on cheap foods, often processed and unhealthy, which is similar to findings by Paterson et al. Introduction to these foods at an early age can extend into continuing to rely on these foods during adulthood.

Participants described symptoms emerging during the transition to college, especially if they grew up in a restrictive eating environment and cited the newfound freedom to make their own food choices contributing to the worsening of their eating behaviors. This aligns with evidence that limited access to highly palatable foods can increase cue-reactivity for these foods. Additionally, this adds merit to the perspective that college students are at risk of developing food addiction due to this important life-stage of emerging adulthood and independence. Other times when symptoms emerged included feeling pressure in school and relationships, largely surrounding body image pressures from peers, which has shown to be a significant contributing factor to the development of eating disorders. Triggering events contributed to the development of symptoms as well, and these included parental divorce, moving, or relationships ending, and the latter two are not captured by the ACE questionnaire. From these
findings, it is possible that certain events that may not be as severe as the events captured by the ACE questionnaire can contribute to the development of food addiction. Another common reason for emergence of symptoms was the worsening of mental health, which aligns with quantitative findings, and other research showing depression and anxiety being associated with poorer diet quality\(^\text{72,100}\), as well as overweight and obesity.\(^\text{101}\)

These findings implicate multiple ways in which food addiction can develop. Although there were strong commonalities among participant descriptions of their childhood eating environments, the themes ranged from positive environments to negative environments. It is possible that a negative environment, characterized by diet culture and body image pressures, can cause an unhealthy relationship with food at an early age, and when combined with other factors later in life, such as worsening mental health or newfound independence, the condition of food addiction can develop. Likewise, having positive memories associated with food may lead to turning to food during times of distress or worsening mental health, and food addiction can develop in this way. However, these are preliminary findings and need further exploration. Nonetheless, these findings have important implications in understanding how food addiction can manifest.

In chapter 5, the psychosocial characteristics of food addiction were explored. From existing literature, food addiction had been associated with higher emotional dysregulation\(^\text{35,56}\), higher non-acceptance of emotional responses\(^\text{25}\), poor impulse control\(^\text{25,35}\), a lack of emotional clarity\(^\text{25,56}\), higher childhood trauma and abuse\(^\text{12,16}\), higher depression\(^\text{64}\), higher anxiety\(^\text{12,64}\), and higher PTSD.\(^\text{18}\) To our knowledge, coping styles had not been explored in individuals with food addiction, but avoidant coping has been found to be higher in those with emotional eating habits.\(^\text{17}\) Based on this, it was hypothesized that individuals with food addiction in this study would show higher scores in ACEs, depression, anxiety, stress, PTSD, emotion dysregulation, and emotion-focused and avoidant coping, and lower scores in problem-focused coping and social support. These relationships were seen in the results, with those with severe food addiction largely showing significantly worse mental health scores than those with no, mild, or moderate food addiction. These findings are significant with other studies.\(^\text{12,18,56,64}\) Of the emotion regulation strategies, the greatest difficulty among those with food addiction was seen with goal-setting, non-acceptance of emotions, and strategies, consistent with other findings.\(^\text{25,35}\) Although no other studies have examined coping styles in this population, the heightened use of avoidant coping by the individuals with food addiction in the current study align with findings on coping styles used by emotional eaters.\(^\text{17}\) These characteristics of individuals with food addiction mirror the characteristics of individuals with SUD\(^\text{25}\), adding to the evidence of the similar mental and emotional burdens faced by those with food addiction and drug addiction.

These findings were further explored in the qualitative interviews. Participants described distress over the ways in which food addiction impacted their daily life, including social and professional disruptions, as well as a negative impact on their relationships and body image. This was consistent with findings from other qualitative studies\(^\text{29,41,70}\) on the psychosocial implications of food addiction, showing that the social
and interpersonal problems, shame, and stigma faced by this population causes significant emotional and mental distress. Participants in this and other qualitative studies expressed significant distress over how their behavior impacted their weight or body image, rather than the behavior itself. This again mirrors the SUD perspective, for example, a cigarette smoker is distressed about the impacts of smoking on health rather than the act of smoking itself. Another common symptom was mental preoccupation with food, consistent with other studies. Using food to cope with emotions was another common behavior described by interview participants. This is consistent with other qualitative studies and aligns with the quantitative findings from this study, where emotion-focused and avoidant coping were scored higher among those with food addiction. Participants expressed the desire to spend less time thinking about food when they were asked about their ideal relationship with food. This highlights the significant mental distress individuals with food addiction face. Findings from chapter 5 have important treatment implications. Potential cognitions to target when developing treatments were identified, including preoccupation with weight and body image. The distress individuals face due to their negative self-image impacted their daily personal and professional life. Identifying the coping strategies used by these individuals provide another potential area to target during treatment by helping individuals learn to use problem-focused coping, rather than avoidant or emotion-focused, which can lead to engaging in food addiction behaviors as a way to cope. Additionally, individuals with food addiction showed difficulty with emotion regulation, which needs to be targeted in treatment. Finally, despite skepticism about the validity of food addiction, findings from this and other studies show that individuals with food addiction face significant psychosocial burdens that impact their daily life and negatively impact their overall mental and physical well-being.

In chapter 6, the diet quality and eating behaviors of young adults with food addiction were explored. There were minimal investigations into this topic, but findings to date had found a higher intake of protein and fat, greater positive and negative anticipated feelings after intake of highly processed food, greater negative anticipated feelings after intake of minimally processed food, and engagement in emotional eating. Individuals with food addiction had a significantly lower intake of vegetables and a significantly higher intake of added sugars and saturated fats. These findings aligned with qualitative data, where participants commonly named sweets and fast/processed foods as their problem foods.

When examining eating styles, there were significant differences seen between those with different levels of food addiction. There were overall lower scores in cognitive restraint and higher scores in emotional eating and uncontrolled eating among those with food addiction but examining Steel with control results provided more insight. Those with mild food addiction had the highest scores in cognitive restraint and the lowest scores in emotional eating and uncontrolled eating compared to those with moderate and severe food addiction. These findings are important in understanding the different eating behaviors among those with different levels of food addiction, and therefore may have different treatment approaches depending on food addiction severity. These findings were consistent with the qualitative results, in which participants described eating until physical ill as well as having control issues, reflected
Participants cited eating in response to negative emotions as a reason for engaging in food addiction behaviors, which was reflected in the higher scores in emotional eating, and also aligned with qualitative findings from other studies.\textsuperscript{70,71} Other reasons for engaging in their current eating behaviors were because they enjoyed the act of eating and because they had positive memories associated with food. Tying food to positive memories and turning to it during a time of distress was posited from findings in chapter 4 and is reflected in the results here.

Participants with food addiction also had higher eating disorder symptom scores, with the highest being among those with severe food addiction, consistent with other findings.\textsuperscript{31,33,35,46} This was again reinforced by qualitative findings, where participants described cycles of restricting and bingeing. Participants with food addiction expressed greater negative anticipated feelings after both healthy food and junk food intake, which is similar to findings by Cummings et al.\textsuperscript{24} When interview participants were asked about how they feel after eating food, the sole theme was negative feelings, again mirroring quantitative results. These findings show the negative emotions surrounding eating experienced by individuals with food addiction, who had common descriptions of guilt and shame after eating any type of food. This has important treatment implications, especially since participants described that these negative feelings caused them to turn to food again to try to feel better, causing a cyclical pattern of behavior. Targeting these negative feelings after eating is an important approach to take during treatment to help to try to break these patterns. There are other cognitions to target from these results. Participants described “blacking out” while eating, which may be treated by using mindfulness techniques, a method that has shown promise in treating individuals with obesity.\textsuperscript{120}

Contributions to the Substance Addiction and Behavioral Addiction Frameworks

Results from these three chapters contributed to both the substance and behavioral addiction frameworks. The substance addiction framework posits that individual risk factors interact with the addictive potential of a substance to result in pathology.\textsuperscript{9,27} These risk factors include a lack of control, impulsivity, trauma exposure, and depression.\textsuperscript{27} Each of these factors were significantly higher among those with food addiction in this study. The addictive potential of a substance using this framework refers to hyper-palatable foods, and findings from this study found that the foods individuals with food addiction had problems with were mainly sweets and fast/processed foods, which reinforced the greater intake of added sugar and saturated fat from qualitative data. Further, environmental risk factors (low cost, high availability, frequent marketing) are present on college campuses and interview participants often mentioned the ubiquity of food as well as reliance on cheap and processed foods. Together, these findings support the substance addiction framework’s perspective on the development and conceptualization of food addiction. Additionally, interview participants described strong cravings as one of their symptoms as well as tolerance and withdrawal, which are characteristic to the substance addiction framework applied to food addiction. However, not all findings aligned with this framework. Some participants expressed that they had a problem with any food, which would align better
with the behavioral addiction framework, where ingestion of an addictive substance is not needed to induce symptoms. Further, when asked about their reasons for eating certain foods, some stated that they just enjoy the act of eating, aligning with the behavioral addiction framework supporters who believe that the act of eating is rewarding in itself. Based on these findings, it is possible that food addiction can take the form of a substance addiction or behavior addiction based off the individual person. This points to the need to pay attention to the specific symptoms experienced by the individual with food addiction in order to develop treatment approaches.

Clinical Implications

Within the substance addiction framework, abstinence is commonly the primary goal. However, other models, such as harm reduction, mindfulness, and acceptance-based behavioral treatments have an evidence-base, and commonly applied to substances that are prevalent in social settings, such as alcohol or nicotine. These models aim to understand specific triggers that can increase risk of problematic use. These approaches may be taken when formulating treatments for intake of hyperpalatable foods. Since food is necessary for survival and foods are available everywhere, it may be best to individualize treatment to determine high-risk situations or triggers. For example, from findings in this study, an individual may be at high-risk to engage in food addictive behaviors when they are isolated and in a negative mood state, and therefore, reducing exposure to this high-risk situation would be a target of counseling. Because over-restriction of foods can lead to later overconsumption or bingeing, abstinence from these foods would unlikely be the recommended approach. However, long-term studies on treatment approaches are needed. Additionally, treatment should likely involve a multidisciplinary approach that includes dietitians and psychologists. Other treatment approaches may include addressing traits such as impulsivity or compulsivity, craving, or motivation.

Policy Implications

The subclinical impact of food addiction is significant, as widespread public health problems are more severe when the addictive substance is legal, accessible, and socially acceptable. Therefore, taking a policy approach is likely to be more effective than solely focusing on clinical applications. As food addiction can lead to obesity, which raises risks for chronic disease, and food addiction is also associated with significant social and professional impairment and distress, the public health consequences are severe. Policy interventions that alter environmental risk factors are shown to be most effective. For example, raising the price of tobacco products, banning indoor smoking, and eliminating the availability of cigarettes in vending machines were all effective environmental strategies to reduce smoking. There is some evidence in the US that taxing sugar-sweetened beverages is effective. Some countries have taken a stricter approach, such as banning child-direct marketing of unhealthy foods. There is great importance in intervening during early childhood, as hyperpalatable foods are introduced very early during a time where the brain is vulnerable. Therefore, strategies to intervene at a young age are necessary, including limiting marketing of hyperpalatable foods to children, as well as increasing the price and reducing access to these foods, while lowering the prices and increasing access to healthy foods.
However, it is difficult to understand how evidence on food addiction can impact policy, as food corporations aim to maximize profits.31

Societal Implications

As displayed in this and other studies, a significant reason for the development of problematic eating behaviors is due to early pressures for an ideal body image and witnessing a diet culture during childhood.29,71 The sociocultural model posits that the three sources of appearance pressure are media, family, and peers.127 The pressure to adhere to a certain body image has severe psychosocial consequences127, including eating disorders, and as has now been discovered, food addiction. This pressure is one of the reasons why participants in this study feel guilt and shame after eating and enter cycles of restricting and bingeing. Despite recent societal efforts to reduce the pressure on an ideal body type, recent investigations have shown that individuals still have internalized thin body type ideals.128 More strategies are needed to reduce this pressure and raise awareness of the severe consequences it can have on an individual’s mental and physical well-being.

Limitations

The research within this dissertation answered the proposed research questions but still has limitations. The quantitative pieces of this dissertation were cross-sectional designs, which cannot determine causation. All data in the survey were self-reported, and therefore the risk of self-response bias is present. The survey used in this study was long, and responses toward the end of the survey dropped, limiting the use of some of the collected data. The variables collected in this study were sensitive in nature, and therefore the recruitment email had to warn students to not take the survey if they felt that questions on food addiction or childhood trauma would trigger a negative emotional response. Although this warning was necessary to ensure the mental safety of students, it potentially limited responses from the population affected by these issues. Additionally, both quantitative and qualitative findings were limited by data from one university in Appalachia and cannot be generalized to the nationwide college population.

Recommendations for Future Research

Based on these findings, in which the food addiction prevalence was 21.9% in the college-attending young adult population, food addiction is a significant problem on college campuses. However, this topic in this population is only beginning to be studied and needs much more investigation. The environmental risk factors for food addiction (high access, low cost, and frequent marketing) are widely present on college campuses, and in addition to the emergence of mental health symptoms at this time, the risk for food addiction is high. More research is needed to validate these findings and add further the understanding of the causes of and symptoms of food addiction in this population. Once this is better understood, testing treatments is needed. This can include clinical treatments, such as counseling with a therapist and/or dietitian, or policy interventions, in which the food environment on college campuses is manipulated to be healthier with lower access to hyperpalatable foods and higher access to healthy foods.
Within the clinical setting, screening for food addiction in conjunction with screening for mental health disorders could be possible once a shortened screening tool is developed. The YFAS is long and has a complicated scoring process that does not allow for rapid results for the diagnosis of food addiction. Therefore, research on the development of a rapid screening tool for food addiction is necessary. Further, the similarities between food addiction and other eating disorders needs better understood. Understanding of food addiction should be conceptualized as a distinct type of eating disorder or a more severe subtype of binge eating disorder needs further investigation.

Conclusion

This dissertation contributes to the understanding of food addiction within the college-attending young adult population. Applying the food addiction framework to problematic eating behaviors has important promise in developing effective treatments that better understand the causes of these behaviors. Food addiction is the result of individual, social, political, and environmental factors. In a seminal paper by Glass and McAtee, the integration of natural and behavioral sciences in order to better study health was envisioned. They state “Eating behavior is an example of a phenomenon that results from synergistic interactions among biological “hunger” and social (eating cues) levels”. Results from this dissertation demonstrate the validity to this perspective. Interpretation of this dissertation should include an understanding of the psychosocial burden of food addiction as well as the interactions that can lead to its development and the role that individuals, environment, society, and policy play. To conclude, a quote from a participant that demonstrates this is below:

“Our development and who we are as a person is much more than our biological makeup and there’s a whole host of factors that fall within person-centered characteristics such as your biology, your physical being, and the attitudes you carry, and the proximal objects that come into play, so the people that you interact with on a daily basis. It also depends on the environment, whether it’s day to day, whether it’s broad societal depictions as well as the historical timepoint that we’re in. I think for health professionals to kind of a take a look at that like ‘okay this is what these people are reading about in the news, here’s how we are communicating it as health professionals, here’s how we are communicating it to patients who are struggling with this’. It’s not just because I’m feeling bad. It’s from parenting, it’s from my early life experiences, from the family interact with, the friends I interact with, plus my biological tendencies.”
References

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Appendix
Appendix A: Additional Quantitative Analyses

Measures

Personality Type: The TIPI contains 10 questions that measure the Big 5 personality traits: extraversion, conscientiousness, openness to experiences, agreeableness, and emotional stability. Statements include “I see myself as extraverted, enthusiastic” or “I see myself as disorganized, careless” with responses ranging on a 7-point scale from disagree strongly to agree strongly. Higher scores in each subscale indicate a more significant presence of each trait.

Alcohol Use: The AUDIT-C contains 3 questions on the frequency and amount of alcohol use. Respondents indicate how often they have drinks containing alcohol, how many drinks they have on a typical day of drinking alcohol, and how often they have more than 6 drinks in one occasion. Higher scores indicate more problematic drinking or a cut-off of 3 for women and 4 for men indicates problem alcohol use.

Substance Use: The DAST-10 contains 10 questions related to use and frequency of substance use such as “Have you used drugs other than those required for medical reasons?” and “Have you engaged in illegal activities in order to obtain drugs?”. Response options are “Yes” or “No”, with affirmative responses being scored as 1 and summed. Higher scores indicate more problematic substance use or scores can be categorized into no problems, low level, moderate level, substantial level, and severe level of substance problems. Demographic variables included assigned sex at birth, gender, age, race/ethnicity, year in school, and height and weight.

Results

The mean alcohol use disorder score was 3.63 ± 2.78 (out of a possible 12), and the mean substance use disorder score was 1.06 ± 1.49 (out of a possible 10). Personality types had a highest possible score of 8, with conscientiousness having the highest mean score of 5.19 ± 1.39, followed by openness to experiences with a mean score of 5.14 ± 1.17. Tables 1 and 2 below summarize psychosocial information. Psychosocial variables that had two scoring options were analyzed both categorically and continuously for descriptive analysis.

Table 1. Distributions of all psychosocial variables using categorical scoring methods.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (N)(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Alcohol Use</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>807 (58.9%)</td>
</tr>
<tr>
<td>No</td>
<td>563 (41.1%)</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>No Problems</td>
<td>595 (44.1%)</td>
</tr>
<tr>
<td>Low Level of Problems</td>
<td>594 (44.0%)</td>
</tr>
<tr>
<td>Moderate Level of Problems</td>
<td>129 (9.6%)</td>
</tr>
<tr>
<td>Substantial Level of Problems</td>
<td>26 (1.9%)</td>
</tr>
<tr>
<td>Severe Level of Problems</td>
<td>6 (0.4%)</td>
</tr>
</tbody>
</table>

**Table 2. Distributions of all psychosocial variables using continuous analysis.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol Use Score</td>
<td>3.63 ± 2.78 (3.48, 3.78)</td>
</tr>
<tr>
<td>Substance Use Score</td>
<td>1.06 ± 1.49 (0.98, 1.14)</td>
</tr>
<tr>
<td>Personality</td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>3.98 ± 1.70 (3.89, 4.07)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>4.84 ± 1.23 (4.77, 4.90)</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>5.19 ± 1.39 (5.12, 5.27)</td>
</tr>
<tr>
<td>Emotional Stability</td>
<td>3.91 ± 1.54 (3.83, 3.99)</td>
</tr>
<tr>
<td>Openness to Experiences</td>
<td>5.14 ± 1.17 (5.08, 5.20)</td>
</tr>
</tbody>
</table>

Psychosocial data represented in frequencies and percentages for categorical variables and in means and standard deviations for continuous variables. SD, standard deviation.

**Table 3. Differences in Psychosocial Characteristics Among Different Levels of Food Addiction.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>p-value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>3.59 ± 0.09 (3.42, 3.75)</td>
<td>4.26 ± 0.33 (3.51, 4.92)</td>
<td>3.81 ± 0.33 (3.15, 4.47)</td>
</tr>
<tr>
<td>Substance Use</td>
<td>0.99 ± 0.04 (0.90, 1.08)</td>
<td>1.66 ± 0.18 (1.31, 2.01)</td>
<td>1.06 ± 0.18 (0.71, 1.41)</td>
</tr>
</tbody>
</table>
One-Way ANOVA results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. * = significant. Significance criteria set at p ≤ .05.

There were significant differences between personality type scores among those with no, mild, moderate, and severe food addiction. Those with severe food addiction showed significantly lower extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience scores than those with no, mild, or moderate food addiction. Steel with control results showed that comparison between no food addiction and each level of food addiction was not actually significant for extraversion and agreeableness. Conscientiousness had significant differences in all comparisons of food addiction to no food addiction, with severe food addiction showing the most significant difference as well as the only significant difference in openness to experience steel with control comparisons. Emotional stability had the most significant differences when comparing mild to no food addiction and severe to no food addiction. Results from this analysis are shown in Table 4.

**Table 4. Differences in Personality Types Among Different Levels of Food Addiction.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Food Addiction</th>
<th>p-value</th>
<th>Steel with Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Extraversion</td>
<td>4.05 ± 0.05 (3.95, 4.16)</td>
<td>3.93 ± 0.20 (3.53, 4.34)</td>
<td>3.62 ± 0.20 (3.21, 4.02)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>4.89 ± 0.04</td>
<td>4.64 ± 0.15</td>
<td>4.75 ± 0.15</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>None vs Mild: .01*</td>
<td>None vs Moderate: .01*</td>
<td>None vs Severe: &lt;.01*</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>5.34 ± 0.04</td>
<td>4.89 ± 0.16</td>
<td>4.70 ± 0.16</td>
<td>4.63 ± 0.11</td>
</tr>
<tr>
<td>(5.26, 5.42)</td>
<td>(4.57, 5.21)</td>
<td>(4.38, 5.02)</td>
<td>(4.42, 4.85)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotional Stability</th>
<th>None vs Mild: &lt;.01*</th>
<th>None vs Moderate: &lt;.01*</th>
<th>None vs Severe: &lt;.01*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.14 ± 0.05</td>
<td>3.22 ± 0.18</td>
<td>3.41 ± 0.18</td>
<td>2.95 ± 0.12</td>
</tr>
<tr>
<td>(4.05, 4.23)</td>
<td>(2.87, 3.57)</td>
<td>(3.05, 3.76)</td>
<td>(2.71, 3.18)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Openness to Experiences</th>
<th>None vs Mild: .03*</th>
<th>None vs Moderate: &lt;.01</th>
<th>None vs Severe: &lt;.01*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.21 ± 0.04</td>
<td>5.25 ± 0.14</td>
<td>4.70 ± 0.14</td>
<td>4.84 ± 0.09</td>
</tr>
<tr>
<td>(5.14, 5.28)</td>
<td>(4.98, 5.53)</td>
<td>(4.42, 4.97)</td>
<td>(4.66, 5.02)</td>
</tr>
</tbody>
</table>

Kruskal-Wallis results showing differences in means between individuals with different levels of food addiction. Steel with control shows significant differences between those with no food addiction versus mild, moderate, and severe food addiction. *= significant. Significance criteria set at p < .05.
Appendix B: Additional Qualitative Analysis

Introduction

The interview guide contained questions that did not directly pertain to the two aims of this study but were valuable to contribute to the understanding of how to treat food addiction. The questions analyzed for this chapter were under the topics of “Positive and Negative Interactions with Health Professionals”, and “Potential Resources to Help”.

Results

Participants were asked if they had ever disclosed information about their eating behaviors to any type of health professional. Over half of the participants stated that they had, with most being during their routine physician appointments, and some having brought it up and therapy or completed counseling with a dietitian. Some participants felt that after working with health professionals, their symptoms improved, and they described helpful strategies and advice they received. Others did not find that their interactions were helpful. Both types of experiences are summarized in the following two topics.

Themes: Positive Interactions with Health Professionals

**Understanding Root Causes.** Participants described that once they identified the root cause of their eating behaviors, either with a therapist or dietitian, they felt more empowered to change them. One participant said, “The dietitian was really good with helping to identify negative thought patterns, where they are coming from, and challenging them.”

**Mindfulness.** Participants felt that once they learned how to be more mindful of their eating habits, they were more aware of whether they wanted to eat due to hunger or due to other reasons and had a better idea of what their body actually needed. For example, “My therapist emphasized trying to really sit down and be mindful about things and really keep accountability and to try to treat food more as something deeply to enjoy, not widely. So, get the most enjoyment out of smaller things instead of taking the most things and getting minimal enjoyment out of it.”

**Being Open and Not Ashamed.** Participants felt that when they were honest about their eating behaviors and expressed vulnerability, their healthcare provider was able to provide better advice. One participant said, “It was very freeing to share with a stranger and not feel judged….In that relationship I allowed myself the freedom to trust her and say what I needed to say with disregard to consequences so it was really freeing.”

**Getting Rid of Guilt and Ideal Body Image.** Participants felt that being able to let go of the guilt associated with eating was integral to changing their mental and emotional burden of food addiction, and subsequently their eating habits. One participant said “It was just really finding that balance of recognizing when I say no, when I say yes, and finding that balance that I can eat guilt free at times. I can eat ice cream and feel okay and know there’s opportunities to make a different decision later.” Other participants
were able to get rid of the pressure to adhere to a certain body type. For example, “Everything that addiction and obsession about food is all because of weight, so once I stepped back and realized that so much is happening all the time, like my body is working so hard to keep me alive, then food wasn’t as big of a deal to me. As soon as I stopped worrying about its effect on my body so much it became less of an obsession.”

Themes: Negative Interactions with Health Professionals

Simple Diet and Physical Activity Advice. Participants described discussing their weight or eating with their physician and often receiving standard guidelines about diet and exercise. They felt that this was oversimplifying the issues they struggle with. For example, “They’ll say ‘Well, here’s what you should be eating and this is what you should be doing’ and then they’ll go on and tell me all the health benefits for eating healthy and it almost feels like ‘you should be doing this, you should be doing that’ and not ‘How can I help you achieve these things?’”.

Didn’t Address Food. Participants who had been to therapists often said that they didn’t discuss their issues with food and focused on other problems. They felt that therapists often thought their problems with food weren’t as important as other issues. One participant said, “I did counseling a little bit last year and I had mentioned it but there were other things they tended to focus on so it just never really got addressed.”

Weight Stigma. Participants felt that physicians didn’t take their problems with food seriously and that they were using it as an excuse or that they were lazy. One participant said “I’ve talked to my primary care physician about it before and I didn’t really think it was too stellar. She kind of wrote it off as an excuse for my weight more than she thought it was an actual problem that I could seek help for.”

Themes: Potential Resources to Help

Participants were asked what types of resources they think they would need in order to address their food addiction. This generated three themes.

Therapy and Support Groups. Participants expressed that they felt they needed to address underlying emotional and mental health issues in order to change their eating habits. For example, “More counseling because I can’t ask food companies to stop making puffy Cheetos or anything so I want to be able to look at foods and not fall for them so I think talking to a therapist more about this specific issue.” Participants also felt that support groups would be helpful, with one saying, “I think responsible group accountability would be nice and being able to have people to talk to consistently without that associated shame.”

Learning Moderation and How to Cook Healthily. Participants felt that if they could learn portion control, moderation, and how to prepare foods better they could improve their symptoms. One participant said “I’ve seen dietitians online talk about how you’re allowed to eat things you enjoy, like everything in moderation and eat what makes your body feel nice and what you know is good for you so I feel like more information about
that would be good.” Another participant said, “Being able to make healthy food that tastes good is really important to me”. Many of these participants mentioned working with a dietitian, for example “I feel like talking to the dietitian would help me try to overcome my wrong or very harmful thoughts towards myself and relationship with food.”

**Changing Perceptions About Food and Weight.** Participants felt that in order to make progress on food addiction, society needs to have a different outlook on food and body image. One participant said, “It needs to be widely accepted that food should not be something to judge about because as long as I can remember, people always made comments about other people’s foods, it’s just upsetting.” Another participant said “The first thing at an appointment is how much you weigh… weighing someone and shaming them…. It’s like ‘exercise, be healthy’ because every problem you have must be related to weight. Don’t assume that if people exercise and lose weight and eat healthy that that will solve every problem in their life. So, less discrimination against people who are overweight or have food addiction or are struggling, they always think you can just stop. I don’t think it’s that easy. Otherwise we would handle it. I wouldn’t be here talking about it.”
Appendix C: Institutional Review Board Approval

![West Virginia University Office of Human Research Protections Logo]

**Approval of Human Research Protocol**

09/21/2021

To: Melissa Olfert  
From: WVU Human Research Protection Program  
Protocol Type: Expedited  
Submission Type: Initial  
Funding: N/A  

WVU Protocol #: 2106344268  
Protocol Title: Psychosocial Influences on Young Adult Food Addiction and Emotional Eating

The West Virginia University Institutional Review Board has reviewed and granted your request for approval of Expedited protocol 2106344268, in accordance with the Federal regulations 45 CFR 46, 21 CFR 50, and 21 CFR 56 (when applicable). Additional details concerning the review are below:

- Category 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. [NOTE: Some research in this category may be exempt from the DHHS regulations for the protection of human subjects. See Exempt Categories and 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.]

The following documents were reviewed and approved for use as part of this submission. Only the documents listed below may be used in the research. Please access and print the files in the Notes & Attachments section of your approved protocol.

- Survey for Student Body.pdf  
- Recruitment Email.pdf  
- Referral list.pdf  
- Consent_Survey.pdf
WVU IRB approval of protocol 2106344268 will expire on 09/20/2026.

If any study related activities are to continue beyond the expiration date, a renewal application should be submitted no later than four (4) weeks prior to the expiration date. It is your responsibility to submit your protocol for continuing review.

Once you begin your human subjects research, the following regulations apply:

1. Unanticipated, serious adverse events and/or side effect(s) encountered at WVU or an affiliate site that are related to the research must be reported to the WVU IRB within five (5) days using the Notify IRB action in eIRB.

2. Any Unanticipated Problem or UPIRTSO or other research related event resulting in new or increased risk of harm to study subjects, occurring at WVU or an affiliate site, must be reported to the WVU IRB within five (5) days using the Notify IRB action in eIRB.

3. Any modifications to the protocol or informed consent form must be reviewed and approved by the IRB prior to implementation. These modifications should be submitted as an amendment.

4. You may not use a modified informed consent form until it has been reviewed and approved by the WVU IRB. Only consent forms with the WVU watermark may be used to obtain informed consent from participants.

The WVU Human Research Protection Program will be glad to provide assistance to you throughout the research process. Please feel free to contact us by phone at 304.293.7073 or by email at IRB@mail.wvu.edu.

Sincerely,

Jane Channel, BSN, LNCC, CCRC, CCRN, TNCC
Senior IRB Coordinator
Appendix D: Aim 1 and 2 Survey

Start of Block: Demographics

Q1 Thank you for completing consent and taking this survey. After completing this survey, you will have the option to enter your email for the chance to win one of three $100 American Express gift cards.

Q2 What sex were you assigned at birth?

- Male (1)
- Female (2)

Q3 What is your gender identity?

- Man (1)
- Woman (2)
- Nonbinary (3)
- Self-describe (4) ____________________________________________________
Q4 Which of the following best describes you?

- White or Caucasian (1)
- Black or African American (2)
- Asian or Pacific Islander (3)
- Hispanic or Latino (4)
- Multiracial or Biracial (5)
- Native American or Alaska Native (6)
- Race/ethnicity not listed here (7)

Q5 What is your age?

▼ 18 (1) ... 100 (83)

Q6 What year of school are you currently in?

- Freshman (1)
- Sophomore (2)
- Junior (3)
- Senior (4)
- Graduate/Professional School (5)
Q7 What is your height in inches?

________________________________________________________________

Q8 What is your weight in pounds?

________________________________________________________________

End of Block: Demographics

Start of Block: Food Addiction

Q9 This survey asks about your eating habits in the past year. People sometimes have difficulty controlling their intake of certain foods such as:
- Sweets like ice cream, chocolate, doughnuts, cookies, cake, candy, ice cream
- Starches like white bread, rolls, pasta, and rice
- Salty snacks like chips, pretzels, and crackers
- Fatty foods like steak, bacon, hamburgers, cheeseburgers, pizza, and French fries
- Sugary drinks like soda pop, lemonade, sports drinks, and energy drinks

When the following questions ask about “CERTAIN FOODS” please think of ANY food or beverages similar to those listed in the food or beverage groups or ANY OTHER foods you have had difficulty with in the past year

________________________________________________________________
Q10 In the past 12 months:
<table>
<thead>
<tr>
<th></th>
<th>Never (1)</th>
<th>Less than monthly (2)</th>
<th>Once a month (3)</th>
<th>2-3 times a month (4)</th>
<th>Once a week (5)</th>
<th>2-3 times a week (6)</th>
<th>4-6 times a week (7)</th>
<th>Every day (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I started to eat certain foods, I ate much more than planned. (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I continued to eat certain foods even though I was no longer hungry (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I ate to the point where I felt physically ill (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I worried a lot about cutting down on certain types of food, but I ate them anyways (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I spent a lot of time feeling sluggish or fatigued from overeating. (5)

I spent a lot of time eating certain foods throughout the day. (6)

When certain foods were not available, I went out of my way to get them. For example, I went to the store to get certain foods even though I had other things to eat at home. (7)
I ate certain foods so often or in such large amounts that I stopped doing other important things. These things may have been working or spending time with family or friends. (8)

I had problems with my family or friends because of how much I overate. (13)

I avoided work, school or social activities because I was afraid I would overeat there (9)
When I cut down on or stopped eating certain foods, I felt irritable, nervous or sad. (10)

If I had physical symptoms because I hadn’t eaten certain foods, I would eat those foods to feel better. (11)

If I had emotional problems because I hadn’t eaten certain foods, I would eat those foods to feel better. (12)
When I cut down on or stopped eating certain foods, I had physical symptoms. For example, I had headaches or fatigue. (14)

When I cut down or stopped eating certain foods, I had strong cravings for them. (15)

My eating behavior caused me a lot of distress. (16)
I had significant problems in my life because of food and eating. These may have been problems with my daily routine, work, school, friends, family, or health. (18)

I felt so bad about overeating that I didn’t do other important things. These things may have been working or spending time with family or friends. (19)
My overeating got in the way of me taking care of my family or doing household chores. (20)

I avoided work, school or social functions because I could not eat certain foods there. (21)

I avoided social situations because people wouldn’t approve of how much I ate. (22)

I kept eating in the same way even though my eating caused emotional problems (23)
I kept eating the same way even though my eating caused physical problems. (24)

Eating the same amount of food did not give me as much enjoyment as it used to. (25)

I really wanted to cut down on or stop eating certain kinds of foods, but I just couldn’t. (26)
I needed to eat more and more to get the feelings I wanted from eating. This included reducing negative emotions like sadness or increasing pleasure. (27)

I didn’t do well at work or school because I was eating too much. (28)
I kept eating certain foods even though I knew it was physically dangerous. For example, I kept eating sweets even though I had diabetes. Or I kept eating fatty foods despite having heart disease. (29)

I had such strong urges to eat certain foods that I couldn’t think of anything else. (30)

I had such intense cravings for certain foods that I felt like I had to eat them right away. (31)
I tried to cut down on or not eat certain kinds of food, but I wasn’t successful. (32)

I tried and failed to cut down on or stop eating certain foods. (33)

I was so distracted by eating that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery). (34)
I was so distracted by thinking about food that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery).

(35)

My friends or family were worried about how much I overate.

(36)

Q11 While you were growing up, during the first 18 years of your life:
Q12 Did a parent or other adult in the household often swear at you, insult you, put you down, or humiliate you? OR act in a way that made you afraid that you might be physically hurt?

- Yes (1)
- No (2)

Q13 Did a parent or other adult in the household often push, grab, slap, or throw something at you? OR ever hit you so hard that you had marks or were injured?

- Yes (1)
- No (2)

Q14 Did an adult person at least 5 years older than you ever touch or fondle you or have you touch their body in a sexual way? OR attempt or actually have oral, anal, or vaginal intercourse with you?

- Yes (1)
- No (2)

Q15 Did you often feel that no one in your family loved you or thought you were important or special? OR your family didn’t look out for each other, feel close to each other, or support each other?

- Yes (1)
- No (2)
Q16 Did you *often* feel that you didn’t have enough to eat, had to wear dirty clothes, and had no one to protect you? OR your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

- Yes (1)
- No (2)

Q17 Were your parents *ever* separated or divorced?

- Yes (1)
- No (2)

Q18 Were any of your parents or other adult caregivers *often* pushed, grabbed, slapped, or had something thrown at them? OR sometimes or often kicked, bitten, hit with a fist, or hit with something hard? OR ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

- Yes (1)
- No (2)

Q19 Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?

- Yes (1)
- No (2)
Q20 Was a household member depressed or mentally ill, or did a household member attempt suicide?

- Yes (1)
- No (2)

Q21 Did a household member go to prison?

- Yes (1)
- No (2)

Q22 If you feel the need to talk to someone about your experience of a traumatic event, please refer to the following resources:

- Carruth Center: 304-293-4431
- WVU Collegiate Recovery: 304-293-2547
- The Friendship House, Milan Puskar Health Right: (304) 292-8234
- Help4WV: 304-583-4008
- SAMHSA Treatment Referral Helpline: 800-662-4357
- National Suicide Prevention Lifeline: 800-273-8255

End of Block: Adverse Childhood Experiences

Start of Block: Depression
Q23 Over the last 2 weeks, how often have you been bothered by any of the following problems?
<table>
<thead>
<tr>
<th></th>
<th>Not at all (1)</th>
<th>Several days (2)</th>
<th>More than half the days (3)</th>
<th>Nearly every day (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little interest or pleasure in doing things (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling down, depressed, or hopeless (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble falling or staying asleep, or sleeping too much (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling tired or having little energy (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor appetite or overeating (5)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Feeling bad about yourself, or that you are a failure or have let yourself or your family down (6)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Trouble concentrating on things, such as reading the newspaper or watching the television (7)</td>
<td></td>
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</tr>
</tbody>
</table>
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual (8)

Thoughts that you would be better off dead, or of hurting yourself (9)

Display This Question:

If Over the last 2 weeks, how often have you been bothered by any of the following problems? = Thoughts that you would be better off dead, or of hurting yourself [ Several days ]
Or Over the last 2 weeks, how often have you been bothered by any of the following problems? = Thoughts that you would be better off dead, or of hurting yourself [ More than half the days ]
Or Over the last 2 weeks, how often have you been bothered by any of the following problems? = Thoughts that you would be better off dead, or of hurting yourself [ Nearly every day ]

Q24 If you feel the need to talk to someone, please refer to the following resources:
Carruth Center: 304-293-4431
WVU Collegiate Recovery: 304-293-2547
The Friendship House, Milan Puskar Health Right: (304) 292-8234
Help4WV: 304-583-4008
SAMHSA Treatment Referral Helpline: 800-662-4357
National Suicide Prevention Lifeline: 800-273-8255

End of Block: Depression

Start of Block: Anxiety
Q25 Over the last 2 weeks, how often have you been bothered by the following problems?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Not at all (1)</th>
<th>Several Days (2)</th>
<th>More than half the days (3)</th>
<th>Nearly every day (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling nervous, anxious, or on edge (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not being able to stop or control worrying (2)</td>
<td></td>
<td></td>
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<tr>
<td>Worrying too much about different things (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trouble relaxing (4)</td>
<td></td>
<td></td>
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<tr>
<td>Being so restless that it is hard to sit still (5)</td>
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<tr>
<td>Becoming easily annoyed or irritable (6)</td>
<td></td>
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<tr>
<td>Feeling afraid, as if something awful might happen (7)</td>
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</table>

End of Block: Anxiety

Start of Block: Stress
Q26 The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by selecting how often you felt or thought a certain way.
<table>
<thead>
<tr>
<th>Never (1)</th>
<th>Almost Never (2)</th>
<th>Sometimes (3)</th>
<th>Fairly Often (4)</th>
<th>Very Often (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>How often have you been upset because of something that happened unexpectedly? (2)</td>
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<td></td>
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<tr>
<td>How often have you felt that you were unable to control the important things in your life? (5)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you felt nervous and &quot;stressed&quot;? (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you felt confident in your ability to handle your personal problems? (6)</td>
<td></td>
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<tr>
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</tr>
<tr>
<td>How often have you felt that things were going your way? (7)</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Question</td>
<td>Options</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you felt that you could not cope with all the things that you had to do? (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you been able to control irritations in your life? (9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you felt that you were on top of things? (10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you been angered because of things that were outside of your control? (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often have you felt that difficulties were piling up so high that you could not control them? (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**End of Block: Stress**

**Start of Block: Emotion Dysregulation**
Q27 Please indicate how often the following apply to you.
<table>
<thead>
<tr>
<th></th>
<th>Almost Never (1)</th>
<th>Sometimes (2)</th>
<th>About Half of the Time (3)</th>
<th>Most of the Time (4)</th>
<th>Almost Always (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I pay attention to how I feel (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I have no idea how I am feeling (5)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I have difficulty making sense out of my feelings (6)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I care about what I am feeling (7)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am confused about how I feel (8)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>When I’m upset, I acknowledge my emotions (9)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>When I’m upset, I become embarrassed for feeling that way (10)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>When I’m upset, I have difficulty getting work done (11)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>When I’m upset, I become out of control (12)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Statement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>---------------------------------------------------------------------------</td>
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<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>When I'm upset, I believe that I will end up feeling very depressed (13)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I have difficulty focusing on other things (14)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I feel guilty for feeling that way (15)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I have difficulty concentrating (16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I have difficulty controlling my behaviors (17)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, there is nothing I can do to make it better (18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I become irritated with myself for feeling that way (19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Rating</td>
<td></td>
<td></td>
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<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, I lose control over my behavior (20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I'm upset, it takes me a long time to feel better (21)</td>
<td></td>
<td></td>
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</tbody>
</table>

End of Block: Emotion Dysregulation

Start of Block: Eating Styles
Q28 Please answer the following questions about your eating habits.
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<thead>
<tr>
<th></th>
<th>Definitely true (1)</th>
<th>Mostly true (2)</th>
<th>Mostly false (3)</th>
<th>Definitely false (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I smell a food that smells and looks very good, I find it very difficult to keep from eating, even if I have just finished a meal. (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I deliberately take small helpings as a means of controlling my weight. (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I feel anxious, I find myself eating. (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes when I start eating, I just can’t seem to stop. (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being with someone who is eating often makes me hungry enough to eat also. (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I feel blue, I often overeat. (6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I see a real delicacy, I often get so hungry that I have to eat right away. (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I get so hungry that my stomach often seems like a bottomless pit. (8)

I am always hungry so it is hard for me to stop eating before I finish the food on my plate. (9)

When I feel lonely, I console myself by eating. (10)

I consciously hold back at meals in order not to weight gain. (11)

I do not eat some foods because they make me fat. (12)

I am always hungry enough to eat at any time. (13)
Q29 How often do you feel hungry?

- Only at meal times (1)
- Sometimes between meals (2)
- Often between meals (3)
- Almost always (4)

Q30 How often do you avoid "stocking up" on tempting foods?

- Almost never (1)
- Seldom (2)
- Usually (3)
- Almost always (4)

Q31 How likely are you to consciously eat less than you want?

- Unlikely (1)
- Slightly likely (2)
- Moderately likely (3)
- Very likely (4)
Q32 Do you go on eating binges though you are not hungry?

- Never (1)
- Rarely (2)
- Sometimes (3)
- At least once a week (4)

Q33 On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want whenever you want it) and 8 means total restraint (constantly limiting food intake and never 'giving in') what number would you give yourself?

▼ 1 (1) ... 8 (8)
Q34 The following questions ask how you have sought to cope with hardship in your life. Read the statements and indicate how much you have been using each coping style.
<table>
<thead>
<tr>
<th></th>
<th>I haven't been doing this at all (1)</th>
<th>A little bit (2)</th>
<th>A medium amount (3)</th>
<th>I've been doing this a lot (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I've been turning to work or other activities to take my mind off things (1)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been concentrating my efforts on doing something about the situation I'm in (2)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been saying to myself &quot;this isn't real&quot; (3)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been using alcohol or other drugs to make myself feel better (4)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been getting emotional support from others (5)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been giving up trying to deal with it (6)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been taking action to try to make the situation better (7)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>I've been refusing to believe that it has happened (8)</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
I've been saying things to let my unpleasant feelings escape (9)

I've been getting help and advice from other people (10)

I've been using alcohol or other drugs to help me get through it (11)

I've been trying to see it in a different light, to make it seem more positive (12)

I've been criticizing myself (13)

I've been trying to come up with a strategy about what to do (14)

I've been getting comfort and understanding from someone (15)

I've been giving up the attempt to cope (16)

I've been looking for something good in what is happening (17)
I've been making jokes about it (18)

I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping (19)

I've been accepting the reality of the fact that it has happened (20)

I've been expressing my negative feelings (21)

I've been trying to find comfort in religion or spiritual beliefs (22)

I've been trying to get advice or help from other people about what to do (23)

I've been learning to live with it (24)

I've been thinking hard about what steps to take (25)
I've been blaming myself for things that happened (26)

I've been praying or meditating (27)

I've been making fun of the situation (28)

End of Block: Coping

Start of Block: Healthy Eating Index

Q35 On average, how many servings of fruit (not including juice) do you eat per day?

Example: 1 serving fruit = 1/2 cup cut-up fruit, 1/2 a banana, or one small piece of whole fruit (apple, orange, pear etc.) One small piece of whole fruit is the size of a baseball. 1/2 cup cut-up fruit is the size of a computer mouse.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)
Q36
On average, how many servings of 100% fruit juice do you drink per day? Note: Do not include fruit flavored drinks such as Hi-C, Tang, Sunny-D, etc.

Example: 1 serving juice = 1/2 cup 100% fruit juice (apple, grape, orange, etc.), 1 cup of juice = juice box.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Q37
Now, think about all the vegetables you eat in a day. On average, how many servings of vegetables do you eat per day? Note: Any vegetable or 100% vegetable juice counts as a member of the vegetable group.

Example: 1 serving = 1 cup of raw vegetables, 1 cup of salad, 1/2 cup cooked vegetables, or 1/2 cup 100% vegetable juice. One cup of raw vegetables is the size of a baseball. 1/2 cup cooked vegetables is the size of a computer.
mouse.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Q38
Now, think about just the green vegetables you eat in a day like spinach, green beans, kale, broccoli, zucchini, or other mostly green vegetables. On average, how many servings of green vegetables do you eat per day? NOTE: Do not include starchy vegetables like green peas.

Example: 1 serving=1 cup raw vegetables or ½ cup cooked vegetables. 1 cup raw vegetables is the size of a
baseball. ½ cup cooked vegetables is the size of a computer mouse.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Q39
Now, think about just the starchy vegetables you eat in a day like corn, green peas, or potatoes. On average, how many servings of starchy vegetables do you eat per day?

Examples: 1 serving= 1 cup raw vegetable or ½ cup cooked vegetables. 1 cup raw vegetables is the size of a
Q40
On average, how many servings of grains do you eat per day?

Examples: 1 serving = 1 slice of bread; ½ cup grits, 1 cup of ready-to-eat cereal, ½ cup oatmeal, 1 small tortilla, ½
cup cooked rice, or ½ cup pasta. 1 cup ready-to-eat cereal is the size of a baseball.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Q41 On average, how often do you eat grains?

- A couple times per week (1)
- A couple times month (2)
- A couple times per year (3)
- Almost never (4)
- Never (5)
- Choose not to answer (6)
Q42
Now, just think about whole grains you eat like whole wheat bread, whole grain crackers, brown rice, or oatmeal. On average, how many servings of whole grains do you eat per day?

Examples: 1 serving = 1 slice whole wheat bread, 5-6 whole grain crackers, 3 cups popcorn, ½ cup cooked brown rice, or ½ cup oatmeal.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Display This Question:
If Now, just think about whole grains you eat like whole wheat bread, whole grain crackers, brown ri... = Less than 1
Q43 On average, how often do you eat whole grains?

- A couple times per week (1)
- A couple times per month (2)
- A couple times per year (3)
- Almost Never (4)
- Never (5)
- Choose not to answer (6)

Q44 On average, how many servings of milk do you eat or drink per day?

Examples: 1 serving = 1 cup of milk, 1 cup of yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese. 1 cup of milk is the size of a carton of milk. 1 serving of cheese is the size of your index finger.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)
Q45 On average, how often do you eat or drink milk products?

- A couple times per week (1)
- A couple times per month (2)
- A couple times per year (3)
- Almost never (4)
- Never (5)
- Choose not to answer (6)

Q46
Now, just think about the milk products you eat per day. On average, how many servings of low-fat milk products do you eat per day?

Examples: 1 serving = 1 cup of skim milk, 1 cup of low-fat yogurt, or 1.5 ounces of low-fat cheese. 1 cup of milk is
the size of a milk carton. 1 serving of cheese is the size of your index finger.

○ Less than 1 (1)
○ 1 (2)
○ 2 (3)
○ 3 (4)
○ 4 (5)
○ 5 (6)
○ 6 or more (7)
○ Choose not to answer (8)

Display This Question:

If Now, just think about the milk products you eat per day. On average, how many servings of low-fat... = Less than 1

Q47 On average, how often do you eat or drink low-fat milk products?

○ A couple times per week (1)
○ A couple times per month (2)
○ A couple times per year (3)
○ Almost never (4)
○ Never (5)
○ Choose not to answer (6)
Q48
On average, how many servings of **beans (legumes)** do you eat **per day**? Note: All foods made from dry beans, canned beans, peas, and lentils are considered part of this group.

*Examples: 1 serving = ½ cup cooked beans. ½ cup cooked beans is the size of a computer mouse.*

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

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Q49
On average, how many servings of **nuts or seeds** do you eat **per day**?

*Examples: 1 serving = 1 tablespoon of peanut butter; ½ ounces of nuts or seeds. 1 tablespoons of peanut butter is*
the size of the tip of your thumb.

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

Q50
On average, how many servings of seafood do you eat per day? Note: All foods made of fish, shrimp, crab, and shellfish are considered part of this group.
Examples: 1 serving = 3 ounces of fish. 3 ounces of fish is the size of a deck of cards

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

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**Display This Question:**

If On average, how many servings of seafood do you eat per day? Note: All foods made of fish, shrimp... = Less than 1

Q51 On average, how often do you eat **seafood**?

- A couple times per week (1)
- A couple times per month (2)
- A couple times per year (3)
- Almost never (4)
- Never (5)
- Choose not to answer (6)
Q52
On average, how many sugar-sweetened beverages do you drink per day?

*Examples: 12 ounces of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice. 12 ounces of soda is the size of one can.*

- Less than 1 (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 (5)
- 5 (6)
- 6 or more (7)
- Choose not to answer (8)

---

**Display This Question:**

*If On average, how many sugar-sweetened beverages do you drink per day?  Examples: 12 ounces of soft drinks/soda, fruit flavored drinks, sweetened coffee, and sweet tea. Do not include milk or 100% fruit juice. 12 ounces of soda is the size of one can.*

*Less than 1*
Q53 On average, how often do you drink sugar-sweetened beverages?

- A couple times per week (1)
- A couple times per month (2)
- A couple times per year (3)
- Almost never (4)
- Never (5)
- Choose not to answer (6)

Q54 On average, how much added sugars do you consume per day? Note: Added sugars are often in foods such as breads, cakes, candy, sweet tea, jam, ice cream, or sugar added to food at the table. Do not include naturally occurring sugars such as lactose in milk or fructose in fruits.

Examples: white sugar, brown sugar, raw sugar, corn syrup, corn-syrup solids, high-fructose corn syrup, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, and dextrose.

- None/almost none (1)
- Some (2)
- A lot (3)
- Choose not to answer (4)

Q55 How many servings of saturated fat do you consume on average per day? Note: Saturated fats for these purposes should be considered to be solid fats. Solid fats are fats that are solid at room temperature.

Examples: butter, cakes, cookies, Crisco, coconut oil, beef fat (tallow, suet), chicken fat (lard), stick margarine, and
shortening.

- None/almost none (1)
- Some (2)
- A lot (3)
- Choose not to answer (4)

Q56
On average, how much water do you drink per day?

- None/almost none (1)
- Some (2)
- A lot (3)
- Choose not to answer (4)

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End of Block: Healthy Eating Index

Start of Block: Anticipated Effects of Food
Q57 Imagine that you are eating JUNK food (e.g., sweets, salty snacks, fast foods, sugary drinks).... how much do you expect to feel the following feelings while eating JUNK food?
<table>
<thead>
<tr>
<th></th>
<th>Definitely not (1)</th>
<th>Probably not (2)</th>
<th>Possibly (3)</th>
<th>Probably (4)</th>
<th>Very probably (5)</th>
<th>Definitely (6)</th>
<th>Prefer not to answer (7)</th>
</tr>
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<td>Ashamed  (1)</td>
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<td>✓</td>
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<td>Content  (2)</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>Numb (31)</td>
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Q58 Imagine that you are eating **HEALTHY** food (e.g., fruits, vegetables).... how much do you expect to feel the following feelings **while** eating **HEALTHY** food?
<table>
<thead>
<tr>
<th></th>
<th>Definitely not (1)</th>
<th>Probably not (2)</th>
<th>Possibly (3)</th>
<th>Probably (4)</th>
<th>Very probably (5)</th>
<th>Definitely (6)</th>
<th>Prefer not to answer (7)</th>
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</thead>
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<tr>
<td>Ashamed (1)</td>
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<td>Disgusting (3)</td>
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<td>Energized (4)</td>
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<td>Frustrated (5)</td>
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<td>Happy (6)</td>
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<td>Sluggish (7)</td>
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<td>Relieved (8)</td>
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<td>Glad (10)</td>
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End of Block: Anticipated Effects of Food

Start of Block: Eating Disorders
Q59 On how many of the past 7 days....
<table>
<thead>
<tr>
<th></th>
<th>0 Days (1)</th>
<th>1-2 Days (2)</th>
<th>3-5 Days (3)</th>
<th>6-7 Days (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you been deliberately <strong>trying</strong> to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)? (1)</td>
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<td>Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight? (2)</td>
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<td>Has thinking about <strong>food, eating or calories</strong> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)? (7)</td>
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</tbody>
</table>
Has thinking about **shape or weight** made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)? (8)

Have you had a definite fear that you might gain weight? (10)

Have you had a strong desire to lose weight? (12)

Have you tried to control your weight or shape by making yourself sick (vomit) or taking laxatives? (11)

Have you exercised in a driven or compulsive way as a means of controlling your weight, shape or body fat, or to burn off calories? (9)

Have you had a sense of having lost control over your eating (at the time that you were eating)? (6)
On how many of these days (i.e. days on which you had a sense of having lost control over your eating) did you eat what other people would regard as an unusually large amount of food in one go? (5)

Q60 Over the past 7 days, has your weight or shape influenced how you think about (judge) yourself as a person?

- Not at all (1)
- Slightly (2)
- Moderately (3)
- Markedly (4)

Q61 Over the past 7 days, how dissatisfied have you been with your weight or shape?

- Not at all (1)
- Slightly (2)
- Moderately (3)
- Markedly (4)
**Display This Question:**

If Over the past 7 days, has your weight or shape influenced how you think about (judge) yourself as... != Not at all

Or Over the past 7 days, how dissatisfied have you been with your weight or shape? != Not at all

Q62 If you feel the need to talk to someone, please refer to the following resources:
Carruth Center: 304-293-4431
WVU Collegiate Recovery: 304-293-2547
The Friendship House, Milan Puskar Health Right: (304) 292-8234
Help4WV: 304-583-4008
SAMHSA Treatment Referral Helpline: 800-662-4357
National Suicide Prevention Lifeline: 800-273-8255

End of Block: Eating Disorders

Start of Block: PTSD

Q63 Sometimes things happen to people that are unusually or especially frightening, horrible, or traumatic. For example: a serious accident or fire assault an earthquake or flood seeing someone seriously injured

**Have you ever experienced this kind of event?**

○ Yes (4)

○ No (5)
Q64 In the past month, have you:

<table>
<thead>
<tr>
<th></th>
<th>Yes (1)</th>
<th>No (2)</th>
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</thead>
<tbody>
<tr>
<td>Had nightmares about the event(s) or thought about the event(s) when you did not want to? (1)</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Tried hard not to think about the event(s) or went out of your way to avoid situations that reminded you of the event(s)? (2)</td>
<td>○</td>
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<tr>
<td>Been constantly on guard, watchful, or easily startled? (3)</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Felt numb or detached from people, activities, or your surroundings? (4)</td>
<td>○</td>
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<tr>
<td>Felt guilty or unable to stop blaming yourself or others for the event(s) or any problems the event(s) may have caused? (5)</td>
<td>○</td>
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Display This Question:

*If Sometimes things happen to people that are unusually or especially frightening, horrible, or traumatic = Yes*

Q65 If you feel the need to talk to someone about your experience of a traumatic event, please refer to the following resources:

- Carruth Center: 304-293-4431
- WVU Collegiate Recovery: 304-293-2547
- The Friendship House, Milan Puskar Health Right: (304) 292-8234
- Help4WV: 304-583-4008
- SAMHSA Treatment Referral Helpline: 800-662-4357
- National Suicide Prevention Lifeline: 800-273-8255
Q66 How many people are so close to you that you can count on them if you have great personal problems?

- None (1)
- 1-2 (2)
- 3-5 (3)
- 5+ (4)

Q67 How much interest and concern do people show in what you do?

- None (1)
- Little (2)
- Uncertain (3)
- Some (4)
- A lot (5)
Q68 How easy is it to get practical help from friends or neighbors if you should need it?

- Very difficult (1)
- Difficult (2)
- Possible (3)
- Easy (4)
- Very easy (5)

End of Block: Social Support

Start of Block: Personality

Q69 Here are a number of personality traits that may or may not apply to you. Please select a choice for each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.
Q70 I see myself as:
<table>
<thead>
<tr>
<th></th>
<th>Disagree strongly (1)</th>
<th>Disagree moderately (2)</th>
<th>Disagree a little (3)</th>
<th>Neither agree nor disagree (4)</th>
<th>Agree a little (5)</th>
<th>Agree moderately (6)</th>
<th>Agree strongly (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraverted, enthusiastic (1)</td>
<td></td>
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<td>Critical, quarrelsome (2)</td>
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<td>Dependable, self-disciplined (3)</td>
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<td>Anxious, easily upset (4)</td>
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<td>Open to new experiences, complex (5)</td>
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<td>Reserved, quiet (6)</td>
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<td>Sympathetic, warm (7)</td>
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<td>Disorganized, careless (8)</td>
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<td>Calm, emotionally stable (9)</td>
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<td>Conventional, uncreative (10)</td>
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End of Block: Personality

Start of Block: Alcohol Use

Q71 How often do you have a drink containing alcohol?

- Never (1)
- Monthly or less (2)
- 2-4 times a month (3)
- 2-3 times a week (4)
- 4 or more times a week (5)

Display This Question:
If How often do you have a drink containing alcohol? != Never

Q72 How many standard drinks containing alcohol do you have on a typical day when you drink?

- 1 or 2 (1)
- 3 to 4 (2)
- 5 to 6 (3)
- 7 to 9 (4)
- 10 or more (5)

Display This Question:
If How often do you have a drink containing alcohol? != Never
Q73 How often do you have six or more drinks on one occasion?

- Daily or almost daily (1)
- Weekly (2)
- Monthly (3)
- Less than monthly (4)
- Never (5)

End of Block: Alcohol Use

Start of Block: Substance Use
Q74 These questions refer to drug use in the past 12 months. Please answer No or Yes

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes (1)</th>
<th>No (2)</th>
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<tbody>
<tr>
<td>Have you used drugs other than those required for medical reasons? (1)</td>
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<td>Do you use more than one drug at a time? (2)</td>
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<td>Are you always able to stop using drugs when you want to? (3)</td>
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<td>Have you had &quot;blackouts&quot; or &quot;flashbacks&quot; as a result of drug use? (4)</td>
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<td>Do you ever feel bad or guilty about your drug use? (5)</td>
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<td>Does your significant other (or parents) ever complain about your involvement with drugs? (6)</td>
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<td>Have you neglected your family because of your use of drugs? (7)</td>
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<td>Have you engaged in illegal activities in order to obtain drugs? (8)</td>
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<tr>
<td>Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs? (9)</td>
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<tr>
<td>Have you had medical problems as a result of your drug use (e.g. memory loss, hepatitis, convulsions, bleeding, etc.)? (10)</td>
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</table>
Q75 Think about all the **vigorous** activities that you did in the last 7 days. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

Q76 During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

- Days per week: (1) __________________________
- None (4)

Q77 How much time do you spend doing **vigorous** physical activities on one of those days?

- Hours per day: (1) __________________________
- Minutes per day: (2) __________________________
Q78 Think about all the **moderate** activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

Q79 During **the last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

- Days per week: (1) ________________________________________________
- None (2)

Q80 How much time did you usually spend doing **moderate** physical activities on one of those days?

- Hours per day: (1) ________________________________________________
- Minutes per day: (2) ________________________________________________
Q81 Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

Q82 During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

☐ Days per week: (1) ________________________________________________

☐ None (2)

Display This Question:

If During the last 7 days, on how many days did you walk for at least 10 minutes at a time? != None

Q83 How much time did you usually spend walking on one of those days?

☐ Hours per day: (1) ________________________________________________

☐ Minutes per day: (2) ________________________________________________

Q84 On average, during a weekday (Monday-Friday), how many hours/minutes in a day (24 hours) do you...

Q85 Take a nap on a chair or couch?

☐ Hours: (1) ________________________________________________

☐ Minutes: (2) ________________________________________________
Q86 Read while being seated or lying down?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q87 Sit at the computer for work or leisure?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q88 Watch television, video, or DVD?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q89 Perform a hobby while being seated, such as knitting, doing puzzles, or playing an instrument?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________
Q90 On average, during the weekend (Saturday and Sunday) how many hours/minutes in a day (24 hours) do you...

Q91 Take a nap on a chair or couch?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q92 Read while being seated or lying down?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q93 Sit at the computer for work or leisure?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________

Q94 Watch television, video, or DVD?

☐ Hours: (1) ________________________________

☐ Minutes: (2) ________________________________
Q95 Perform a hobby while being seated, such as knitting, doing puzzles, or playing an instrument?

☐ Hours: (1) ________________________________________________

☐ Minutes: (2) ________________________________________________

End of Block: Physical Activity and Sedentary Behavior

Start of Block: Block 19

Q96 The primary objective of this study is to investigate psychosocial factors related to food addiction. If you are shown to have high food addiction symptoms, would you be willing to be contacted again to participate in a brief interview with questions regarding this topic? This will include an additional incentive.

☐ Yes (1)

☐ No (2)

Display This Question:

*If The primary objective of this study is to investigate psychosocial factors related to food addiction... = Yes*

Q97 Please enter your email to be contacted for an interview if you meet the criteria:

________________________________________________________________

End of Block: Block 19

Start of Block: Block 20

Q98 Thank you for taking this survey. To be entered with the chance to win one of 3 $100 American Express gift cards, please enter your email below.

________________________________________________________________

End of Block: Block 20
Rachel Anne Wattick
Address: 305 Maple Ave Apt B Morgantown, WV 26501
Email: rawattick@mix.wvu.edu | Telephone: 412-584-9220

EDUCATION
Graduate:
Doctorate of Animal and Food Sciences, emphasis in Human Nutrition | West Virginia University | Morgantown, WV | May 2022
Current GPA: 3.90
Dissertation: Psychosocial Influences On and Characteristics of Young Adult Food Addiction
Master’s of Nutritional and Food Science | West Virginia University | Morgantown, WV | August 2020
GPA: 3.884
Thesis: Therapeutic Approaches to Recovery in West Virginia
Dietetic Intern | West Virginia University | Morgantown, WV | August 2020 – May 2021

Undergraduate:
Bachelor’s of Science in Human Nutrition and Foods | West Virginia University | Morgantown, WV | May 2018
Overall GPA: 3.59
Honors GPA: 4.0

PROFESSIONAL CREDENTIALS
Registered Dietitian Nutritionist | Commission on Dietetic Registration | August 2021 – Present

RESEARCH EXPERIENCE
Areas of Focus: 1) Eating and Addictive Behaviors 2) Mental Health Disorders, 3) Culinary Medicine
Graduate Research Assistant | Olfert Lifestyle Intervention Research Lab | May 2018 – Present
  • Research focus on diet and eating behavior, mental health, and lifestyle medicine
  • Lead on projects involving teaching the Mediterranean Diet to health professionals with a cultural immersion in Italy with evaluation, investigating the relationship between diet quality and mental health in Appalachia, examining college student diet quality and health behaviors, and teaching culinary medicine to medical students
  • Involved in all steps of research design and study administration

Graduate Research Assistant | WVU School of Public Health | Aug 2018 – May 2019
  • Completed three 8-week research rotations with three diverse Public Health faculty
  • Projects included: 1) data analysis of a Diabetes and Hypertension Self-Management Program and investigating the mental burden of diabetes, 2) a literature review on community resources needed to implement effective substance use prevention interventions, and 3) a systematic review on loneliness and depression
Undergraduate Research Assistant | Olfert Lifestyle Intervention Research Lab | Oct. 2016- May 2018

• Research focus on diet, mental health, nutrition therapy for substance use disorder, and food insecurity
• Assisted with study design, IRB approval, literature reviews, survey administration, data analysis, focus group administration, and intervention implementation

PUBLICATIONS


**POSTER PRESENTATIONS**


ORAL PRESENTATIONS


WEB ARTICLES


TEACHING EXPERIENCE

Guest Lecturer | Various Higher Education Institutions | March 2019 – Present
• Introductory Nutrition – Meredith College, November 2021
• Healthy Eating Active Living – West Virginia University, September 2021
• Exercise Nutrition – West Virginia University, March 2021, March 2022
• Community Nutrition – West Virginia University, March 2019

Graduate Teaching Assistant | WVU Davis College of Agriculture, Natural Resources, and Design | Aug. 2018-Present

• Maternal & Child Nutrition (online) – Spring 2022
• Culinary Medicine (in-person and online) – Spring 2019, 2020, 2021, 2022
• Mediterranean Diet in Culinary Medicine, Food Systems, and Policy (online) – Spring 2019

Graduate Teaching Assistant | WVU School of Public Health | Aug. 2018 – May 2019

• Social and Behavioral Theory – Fall 2018, Spring 2019
• Social Determinants of Health – Spring 2019

Teaching Assistant | Applied and Environmental Microbiology | Jan. 2017- May 2017

• Prepared necessary materials for the Applied and Environmental Microbiology Lab including bacterial broths, agar plates, cultures, and cleaned and organized equipment
• Learned in depth about lab safety, proper handling procedures, and microorganisms

PROFESSIONAL EXPERIENCES

Summer Undergraduate Research Experience | West Virginia University | Morgantown, WV

• Awarded 1 of 9 summer 2017 research internships in the Davis College of Agriculture, Natural Resources, and Design
• Completed 8 weeks of full-time research in the Lifestyle Intervention Research Lab
• Designed the Mountaineers for Recovery and Resilience Study and assisted in the Community Assessment and Education to Promote Behavioral Health Planning and Evaluation project.
• Attended student researcher development workshops on topics including how to communicate your research, networking, and the art of research writing

Leadership Institute | Global Brigades | Esteli, Nicaragua

• Traveled to Nicaragua in August 2017 to participate in Global Brigades Leadership Institute
• Learned leadership, networking, and planning skills
• Started a Global Brigades chapter on campus
• Learned in depth about how Global Brigades’ Holistic Model empowers communities to sustain themselves through breaking the cycle of poverty
• Established connections with ambitious students across the country
• Lessons learned lead to starting Global Business Brigades Chapter on campus

Davis College Mentoring Program | West Virginia University | Morgantown, WV

• Selected to participate in mentorship program for the 2017-2018 school year
• Worked closely with assigned mentor, Cindy Fitch, to learn more about the nutrition and public health field

HONORS AND AWARDS

Davis College Animal and Nutritional Sciences Outstanding Senior | West Virginia University, 2018
Robert J. Munn Library Scholars Award | $1000 | West Virginia University, 2018
SURE Student Enhancement Grant | $500 | West Virginia University, 2017
PROFESSIONAL MEMBERSHIPS
West Virginia Academy of Nutrition and Dietetics | 2020 - Present
Academy of Nutrition and Dietetics | 2020 - Present
American Society for Nutrition | 2018 - Present
Society for Nutrition Education and Behavior | 2017 - Present

CERTIFICATIONS AND TRAININGS
- Adult, Child, and Infant CPR
- ServSafe Food Production Manager Certificate
- Collaborative Institutional Training Initiative Program (CITI) Certificates

LEADERSHIP EXPERIENCES
Co-President | WVU Delta Omega Public Health Honor’s Society | March 2019- August 2019
- Coordinated meetings of the society
- Managed budget
- Planned events to increase public health outreach and awareness and student participation

WVU Campus Chairperson | Global Brigades | Nov. 2017 – Aug. 2018
- Appointed to this position by WVU Global Brigades Presidents of the Public Health, Medical, Dental, and Business chapters
- Led the Empowered Board, which spreads the Global Brigades mission and grows chapters on campus
- Led and unified all existing chapters to establish a strong Global Brigades presence
- Maintained contact with Global Brigades organization in Nicaragua, Honduras, Panama, and Ghana

Ambassador | WVU Collegiate Recovery | Sep. 2017- Aug. 2018
- Held hours at Serenity Place, the location of WVU Collegiate Recovery
- Hosted a monthly nutritional and culinary therapeutic activity at Serenity Place
- Served as a peer mentor for individuals in recovery

Vice President | WVU Global Business Brigades | Aug. 2017-May 2018
- Initiated organization at WVU to add to Global Brigades Holistic Model
- Created recruitment plan and materials
- Recruited officers to other positions
- Reviewed applications and interviews applicants to accept qualified students
- Planned meetings and maintains contact with Global Brigades staff

Vice President | WVU Global Dental Brigades | May 2017- May 2018
- Promoted from prior position as secretary
- Appointed other officers to positions
- Head of recruitment efforts, which lead to a 28% increase in applications
- Reviewed applications and interviews applicants to accept qualified students
• Planned for upcoming brigade
• Educated students to understand the Holistic Model

Secretary | WVU Global Medical and Dental Brigades | May 2016-Apr. 2017
• After first experience in Nicaragua with WVU Global Medical and Dental Brigades, appointed secretary for both organizations
• Assisted in recruiting efforts
• Wrote agendas, meeting minutes, and schedules
• Reviewed applications and interviewed applicants to accept qualified students
• In Nicaragua, led a public health group for the sanitary infrastructure projects

VOLUNTEER EXPERIENCE
Volunteer | WVU Global Medical and Dental Brigades | March 2016- March 2020
• Traveled over spring break to deliver medical, dental, and gynecological care to rural Nicaraguans
• In addition to clinical care, constructed sanitary infrastructure consisting of showers, toilets, and septic tanks for individual families, dug trenches for pipelines to contribute to the community water project delivering clean water to communities

Volunteer | WVU Global Business Brigades | Aug. 2017- May 2018
• Attended weekly meetings and class times
• Learned financial and business terminology and practices to instruct community members in Nicaragua
• Traveled in May 2018 to consult small businesses, teach financial literacy, and establish community banks in rural regions of Nicaragua

Volunteer | WVU Helping Hands | May. 2016- May 2018
• Participated in volunteer activities including Sunnyside Clean Ups and Treat Bags for cancer patients

• Traveled each summer to Appalachian regions such as WV, KY, and TN
• Repaired roofs, siding, and flooring of homes
• Constructed wheelchair ramps for disabled individuals
• Destructed and reconstructed decks for homes
• Cleaned inside and outside of homes