Food Security Status and Disordered Eating of Male High School Football Players in Rural, Appalachian Mississippi Participating in a Food Education Program

Miller Carlton
FOOD SECURITY STATUS AND DISORDERED EATING OF MALE HIGH SCHOOL FOOTBALL PLAYERS IN RURAL, APPALACHIAN MISSISSIPPI PARTICIPATING IN A FOOD EDUCATION PROGRAM

By

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A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

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DEDICATION

This thesis is dedicated to each and every individual who has encouraged me throughout my college experience.
ACKNOWLEDGEMENTS

I would like to thank Dr. David H. Holben, my thesis advisor and research director, for his guidance and patience throughout this process. I would like to thank the committee for their support and encouragement through this process. I would like to thank the Sally McDonnell Barksdale Honors College for funding my travel to present at the Food and Nutrition Conference and Expo and for encouraging and supporting my research, and I would also like to thank UM Foundation and Nutrition Security Support Fund for funding my research. I would like to also thank my family and friends for supporting and encouraging me in all my endeavors.
ABSTRACT

Food insecurity is associated with disordered eating in National Collegiate Athletic Association (NCAA) male athletes. This study evaluated the impact of a food education program on youth food security and disordered eating of high school football players in rural, Appalachian Mississippi. A Pre-Post design was utilized. Prospective participants (n=47) were recruited in July, 2019. The 12-week season-long food education program included weekly education with practical food-based sport nutrition principles along with food packages to implement principles at home. Youth food security was measured using Self-administered Youth Food Security Module (Connell, 2004). Disordered eating was measured using 5-item scale (Morgan, Reid, & Lacey, 2000). Change in youth food security was assessed (Pearson Chi-squared). Change in disordered eating score was computed and difference in disordered eating between food secure and food insecure participants was assessed (independent t-test).

Participants (n=26/47, 55.3%) completed both the pre- and post-surveys and were: 1) males 16.01.2 years; 2) African American (n=17/26, 65.4%), White (n=8/26, 30.8%), and other (n=1/26, 3.8%); 3) Hispanic (n=1/24, 4.2%); and 4) enrolled in ninth (n=5/26, 19.2%), tenth (n=3/26, 11.5%), eleventh (10/26, 38.5%), or twelfth (n=8/26, 30.8%) grades. Pre youth food security was: food secure (n=21/26, 80.8%) and food insecure (n=5/26, 19.2%), and post youth food security was food secure (n=24/26, 92.3%) and food insecure (n=2, 7.7%). Youth food security significantly changed from pre to post (p=.003). At pre and post, respectively, 1/26 (3.8%) and 3/26 (11.5%) had a disordered eating score consistent with disordered eating. Yet, disordered eating score did not significantly change from pre to post by youth food security.
(p=.779). Food education program improves youth food security of rural high school football players.
PREFACE

This study will seek to understand and observe the impact a food education program has on the food security status and disordered eating status of high school football players in a small, rural town in Mississippi.
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CHAPTER I: INTRODUCTION

The United States Department of Agriculture (USDA) describes food security as having the means to consistently access “nutritionally adequate and safe foods” and the ability “to acquire acceptable foods in a socially acceptable way” in order to live an active and healthy lifestyle (USDA, 2020, p. 1). In contrast, food insecurity is defined as limited or lack of access to nutritionally adequate and safe foods in a socially acceptable manner. Hunger is a term often associated and confused with food insecurity. However, hunger is described as an uncomfortable, physical sensation related to the body’s need for food and can vary in the level of severity on an individual basis (USDA, 2020). In 2019, 5.3 million children in the United States lived in food insecure households with the adults in the household also being food insecure, and 361,000 children lived in households with very low food security (USDA, 2020).

Over the past decade (2009-2019), the American South continued to have the highest percentages of household food insecurity in comparison to other Census regions within the United States (USDA, 2020). In 2009, the USDA reported that metropolitan areas had higher percentages of food insecurity than nonmetropolitan (rural) areas. In contrast, the 2019 report from the USDA reported that rural areas have higher rates of food insecurity than metropolitan areas. Data collected by the USDA in 2018 shows that Southern nonmetropolitan, rural areas had a poverty rate of 20.5%, and Southern metropolitan areas had poverty rate of 14.4%. Poverty rates in the South rank highest among other regions of the United States (USDA, 2018). A majority of states have rural areas within them; however, the economic status and availability within states contribute to their percentage of food secure individuals (USDA, 2019). Rural areas
are often associated with high rates of poverty, and households above the poverty line battle food 
insecurity (Rose, 1999).

Mississippi is known as one of the nation’s poorest states. According to the 2019 USDA 
Rural Health Information Hub report, 1,582,360 people of the state’s 2,976,149 people live in a 
rural area, and the poverty rate in rural Mississippi is 22.6% (USDA, 2020). The percentage of 
food insecure households in Mississippi from 2017 to 2019 was 15.7 percent and was among the 
highest in the United States in the last decade (Coleman-Jensen, 2020). However, “34 of the 82 
counties [in Mississippi] have food insecurity rates over 22% and all of these are considered 
rural except for 4” (Hossfield & Rico Mendez, 2018).

The study associated with this thesis took place in Calhoun County, Mississippi. Of the 
14,361 people who live in Calhoun County, 69.7% identify as White, 28.5% identify as Black, 
and 6.3% identify as Hispanic. 77.5% of the population is a high school graduate or higher and 
11.8% has received a bachelor’s degree or higher honor. The median household income is 
$37,263 (Census Bureau, 2019, p. 1). Calhoun County, as noted by the 2020 Rural-Urban 
Continuum Codes, is classified as a Nonmetro county. It is “completely rural or less than 2,500 
urban population, not adjacent to a metro area” (USDA Rural-Urban Continuum Codes, 2020).

Calhoun County, Mississippi, is an Appalachian Regional Commission (ARC) At-Risk 
county with distressed areas within it due to its unemployment rates over a three-year period, per 
capita market income, and poverty rates (ARC, 2019). Figure 1 shows a map of the Appalachian 
region.

Estimates of food insecurity in the Appalachian region are not fully understood; however, 
Feeding America (2018) maps county-level food insecurity in the United States. Figure 2 
supports that the Appalachian region has particularly high rates of food insecurity.
Figure 1: Map of the Appalachian Region in the United States from the ARC

Map by: Appalachian Regional Commission, November 2009.
The poverty rate of Calhoun County was 26.3% at the time of the study (ARC, 2019). This is characteristic of the American South and Mississippi. Poverty rate is not always indicative of food insecurity within households, but Bhattacharya, Currie, and Haider (2004, p. 857) showed that a child’s diet is negatively impacted by poverty. Access to adequate foods is indicative of food insecurity. Food deserts are “areas in the United States where people have limited access to a variety of healthy and affordable food” (Dutko, Ver Ploeg & Farrigan, 2012, p. 1), and, for rural areas, “33% of the population is at least 10 miles from a grocery store or supermarket” (Dutko, Ver Ploeg & Farrigan, 2012). In a study conducted in 2018, 77% of Mississippi was considered a food desert (Hossfeld & Rico Mendez, 2018). A majority of rural areas do not offer local transportation, which inhibits low-income individuals who may not possess a vehicle from acquiring groceries from supermarkets (Dutko, Ver Ploeg & Farrigan,
These individuals often buy from local farmers markets or are forced to resort to convenience stores for food where fresh produce rarely inhabits the shelves (Piontak & Schulman, 2014).

Lack of access to foods contributes to irregular eating habits. Food utilization is defined as “the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation and depends in large measure on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper childcare” (Rivera & Qamar, 2003). It is difficult to properly utilize food in food insecure households where a variety of foods are unavailable and access to food is limited. Stinson et al. (2018) sought to understand the relationship between food insecurity and inconsistent eating patterns as it negatively impacts individuals’ health. As food insecurity is not often chronic, food insecure individuals enter into a cycle where there are times when food is available and times when food is scarce. In comparison to food secure individuals, food insecure individuals are more susceptible to overeating or binge eating. This negative cycle of food consumption is understood as disordered eating (Stinson et al., 2018).

Food consumption impacts the daily life of all individuals and is particularly important to athletes. Poll, Holben, Valliant and Joung (2018) examined the relationship between the food security status of collegiate athletes and how their experience of food insecurity in high school may have negatively contributed to their eating behaviors as collegiate athletes. This cross-sectional survey of NCAA Division 1 athletes from a Southeastern Conference (SEC) university found that there was a significant correlation between very low food security status and food hoarding, but not binge eating. This study shows the correlation between food security status and disordered eating behaviors among male collegiate athletes (Poll et al., 2018). This study also
introduces the idea that there is a need to study male athletes and that food insecurity and disordered eating are apparent in high school-aged athletes.

Disordered eating is observed when individuals participate in any of the following behaviors: frequent dieting; anxiety associated with specific foods or meal skipping; chronic weight fluctuations and routines surrounding food and exercise; feelings of guilt and shame associated with eating, preoccupation with food; weight and body image that negatively impacts quality of life; a feeling of loss of control around food; including compulsive eating habits; and using exercise, food restriction, fasting or purging to “make up for bad foods” consumed. When these behaviors are learned during adolescence, the likelihood of exhibiting an eating disorder later in life increases (Anderson, 2018).

Food insecurity in the Southern Appalachian region of the United States, as well as the potential for male athletes to exhibit disordered eating in high school when facing food insecurity, precipitated this study. Research on the disordered eating patterns of male athletes is limited. Male athletes are of particular interest due to the limited research studies involving the disordered eating behaviors and food security status of males only. To our knowledge, no studies have been conducted on the impact of a food education program on both food security status and disordered eating.

This study evaluated the impact of a food education program on youth food security and disordered eating of male high school football players in rural, Appalachian Mississippi. Table 1 summarizes the research questions and hypotheses for the study.
Table 1: Research Study Questions and Hypotheses

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Hypotheses</th>
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<tbody>
<tr>
<td>What is the impact of a food education program on youth food security status of</td>
<td>Food security status of the male high school football players from rural,</td>
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<tr>
<td>male high school football players in rural, Appalachian Mississippi?</td>
<td>Appalachian Mississippi will be impacted by the food education program.</td>
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<tr>
<td>What is the impact of a food education program on the disordered eating score of</td>
<td>Disordered eating score of the male high school football players from rural,</td>
</tr>
<tr>
<td>male high school football players in rural, Appalachian Mississippi?</td>
<td>Appalachian Mississippi will be impacted by the food education program.</td>
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CHAPTER II: REVIEW OF LITERATURE

This study evaluated the impact of a food education program on youth food security and disordered eating of male high school football players in rural, Appalachian Mississippi.

Food Security

Food Security Definitions and Measurement

The term food security, the various levels of severity and their meaning had not yet been coined prior to the 1990s. Researchers and government officials were aware of the persistence of hunger and struggle to meet needs within the US population, but they also understood that there were different definitions of hunger. Their first definition of hunger referred to the uncomfortable sensation experienced by an individual when the body requires nutrients (Radimer & Olsen, 2006; USDA, 2020). Their second definition of hunger dealt with an individual’s struggle to acquire necessary nutrients due to low income and availability. These task force members concluded that there was a need to quantify the second definition of hunger to ensure access for all individuals and thus began, in 1990, the development food access surveys and a ten-year plan devoted to researching this specific type of hunger within US population in 1992.

Food security is defined by the USDA as the ability for all members of a household to have adequate amounts of safe and nutritious food in order to live a healthy lifestyle. In contrast, food insecurity is defined by the USDA as the uncertainty of acquiring adequate amounts of safe and nutritious food for the household. As researchers recognized food security as its own term and hunger as a potential side effect, questionnaire-style surveys assessing household food
security status were introduced. After analyzing the collected data, researchers found that several factors related to location and demographics impacted and should be considered when interpreting the results (Radimer & Olsen, 2006).

Before modifying the terms used to describe food insecurity versus food security, the USDA described individuals with “very low food security” as being food insecure with hunger. The descriptive adjustments were implemented in 2006 after the USDA recognized that hunger was interpreted broadly and could be a consequence of prolonged food insecurity. The terms established in 2006 to classify food security status are “high food security,” “marginal food security,” “low food security,” and “very low food security.” High food security is defined as having no issue accessing food and marginal food security is defined as having a few occasions where individuals believed their food supply was insufficient. The diet and intake of food of these individuals did not change. High food security and marginal food security are defined considered food secure. Low food security involves “reports of reduced quality, variety, or desirability of diet,” but the food consumption was not reduced. Very low food security is defined as multiple incidences where the intake of food was reduced and abnormal eating patterns were observed. Low food security and Very low food security describe individuals who are considered food insecure (USDA, 2020).

Table 2: USDA Food Security Definitions

<table>
<thead>
<tr>
<th>Food Security Module Category</th>
<th>Definition</th>
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<tbody>
<tr>
<td>High Food Security a,c</td>
<td>Households had no problems, or anxiety about, consistently accessing adequate food.</td>
</tr>
<tr>
<td>Classification</td>
<td>Description</td>
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</tr>
<tr>
<td>Marginal Food Security&lt;sup&gt;a,d&lt;/sup&gt;</td>
<td>Households had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced.</td>
</tr>
<tr>
<td>Low Food Security&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>Households reduced the quality, variety, and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted.</td>
</tr>
<tr>
<td>Very Low Food Security&lt;sup&gt;b,d&lt;/sup&gt;</td>
<td>At times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food.</td>
</tr>
</tbody>
</table>

<sup>a</sup> = Food Secure, <sup>b</sup> = Food Insecure; <sup>c</sup> = Fully Food Secure, <sup>d</sup> = Not Fully Food Secure

To assess Household Food Security, the USDA uses a survey composed of 18 questions. “Every question specifies the period (last 12 months) and specifies lack of resources as the reason for the behavior or experience” (USDA, 2020). The survey questions on the survey attempt to accommodate various levels of food insecurity severity. The USDA (2020) classifies households as food insecure if they have experienced three or more conditions that indicate food insecurity. The USDA (2020) states that these three conditions are the least severe but would classify a household as food insecure: 1) “They worried whether their food would run out before they got money to buy more,” 2) “The food they bought didn’t last, and they didn’t have money
to get more,” and 3) “They couldn’t afford to eat balanced meals” (USDA, 2020). To be classified as a household having very low food security, the “eating patterns of one or more household [member]s were disrupted, and their food intake reduced, at some time during the year, because they could not afford enough food” (USDA, 2020). The list of questions and the scoring method for this survey appear in Appendix A.

The USDA recommends the use of the Self-Administered Food Security Survey Module for Youth Ages 12 and Older developed by Connell et al. (2004) for studies involving youth. The survey assesses the individuals based on their responses to questions concerning their worries about the presence of food and resources. The survey module can be found in Appendix B.

### Food Insecurity in the United States

Household food security status has been measured in the United States since 1995. To date the peak of food security in the United States occurred in 2011 with 14.9 percent of the population considered food insecure. According to the annual estimate reports from the USDA, food insecurity continued to decline as shown in the figure below.
Of the 10.5 percent of households classified as food secure, 4.1 percent were considered to have a status of very low food security. These percentages entail that 35.2 million individuals were living in food insecure households and 9.0 million adults lived in very low food security households. The USDA reports detail that households with children are more likely to be food insecure than households without children. The percentage of households that are food insecure increases with the presence of younger children and in single parent households (USDA, 2020). Figure 4 and 5 show households most at risk for food insecurity in the United States. As shown in Figure 4, the households most at risk for food security included: 1) Households with single
women with children, 2) Households headed by a Black, non-Hispanic individual, 3) Households outside of and in principal cities, 4) Households with income-to-poverty ratio under 1.85, and 5) households in the South.

Figure 4: USDA At Risk for Food Insecurity by Household Characteristics

As shown in Figure 5, the households most at risk for very low food security included: 1) households with single women with children, 2) Households headed by a Black, non-Hispanic individual, 3) households outside of and in principal cities, 4) households with income-to-poverty ratio under 1.85, and 5) households in the South.
Food Insecurity and Disordered Eating

Individuals who live in households that are food insecure are often more at risk for negative health outcomes and mental health issues than households that are food secure (Thomas, Miller, & Morrissey, 2019). The observed stress inflicted upon individuals living in food insecure households has been shown to impact the mental health of the individuals within the household (Thomas, Miller, & Morrissey, 2019; McLaughlin, Green, Alegria, Costello,
This constant stress is known to weaken the function of the immune system and ultimately cause more colds and stomach issues in children specifically. Whitaker, Phillips, and Orzol (2006) found that with increasing severity of food insecurity is related to behavior issues, depression, and anxiety in children (Whitaker et al., 2006). Similarly, children growing up in food insecure homes are more likely to experience hyperactivity/inattention than those who grew up in food secure homes (Melchoir et al., 2012).

Individuals living in food insecure households were found to have higher hospital visits (Cook et al., 2006) and poorer overall health (Gunderson, & Kreider, 2015) in comparison to food secure households. Along with the aforementioned chronic health concerns for children, there is an increased risk for anemia and asthma with respect to level of food insecurity status (Gunderson, & Kreider, 2015). Research on adults living in food insecure households show similar findings to children living in food insecure households. Gunderson and Kreider (2015) detail that food insecurity is associated with chronic health concerns like mental health issues and disorders, specifically depression, increased risk of diabetes and hypertension, and overall poorer health.

The inconsistent presence of food in an individual’s household is known to encourage disordered eating patterns and poor diet. Studies found that the availability of food in the household contributed to binge eating and can lead to mental and physical health issues (Rasmusson et al., 2018; Yu & Tan, 2016). Food insecure households often have difficulty accessing nutrient dense foods like fruits and vegetables and often consume foods with higher calories and less nutrient density (Ranjit, Macias, & Hoelscher, 2021).

**Measuring Disordered Eating**

There are several other methods for measuring disordered eating. The Disordered Eating Attitude Scale (DEAS) measures disordered eating by assessing the frequency the individuals eat...
specific food groups as well as how the individuals feel about the how/what they eat (Alvarenga, Scagliusi, & Philippi, 2010). The Eating Disordered Assessment for Men (EDAM) is a scale developed specifically for men (Standford & Lemberg, 2012). For the study associated with this thesis, measured disordered eating is measured using the SCOFF disordered eating scale. The SCOFF questionnaire was developed by Morgan, Reid, and Lacey (2000) and includes five questions pertaining to the personal concerns and eating habits of the participants. This questionnaire is included in Appendix C along with the scoring method. Hazzard, Loth, Hooper and Becker (2020) include that “dietary restraint is considered to be a key feature” relating to negative eating behaviors.

Food insecurity has shown to be related to disordered eating patterns like binge eating in cross sectional studies that included adults; however, this correlation had not been observed in adolescents (Hazzard et al., 2020). Overeating or binge eating in combination with the inability to access fresh produce promotes weight gain and can lead to obesity in food insecure households (Stinson et al., 2018; Shankar-Krishnan, 2020). Tester, Lang, and Laraia (2016) conducted a qualitative study that linked the prevalence of binge eating and overeating, as well as food hoarding tendencies, in children living in food insecure homes as it relates to obesity (Tester Lang, & Laraia 2016; Shankar-Krishnan, 2020). Stinson et al. (2018) state, "The chronic cycle between food availability and food scarcity may be associated with the maladaptive eating behaviors observed in our study, amplifying susceptibility to overeating during times of unlimited access to food and thus predisposing food insecure individuals to obesity and weight gain.” The aforementioned research studies identified the relationship between food insecurity and disordered eating patterns, specifically overeating and binge eating.
Disordered eating behaviors have a known correlation with food insecurity, especially in women (Tester, Lang & Laraia, 2016). It is known to lead to the acquisition of an eating disorder and is most commonly associated with women. This association has recently been expanded by the evidence that men struggle with disordered eating behaviors as well. Carter et al. (2008) reported that athletes are more susceptible to disordered eating and equate their athletic performance to their weight. Poll et al. (2018) conducted research among male collegiate athletes and determined that binge eating was not associated with food insecurity in collegiate athletes while in high school.

**Food Assistance Programs and Proposed Solutions**

**Food Assistance Programs**

The United States government has implemented food assistance programs. These programs include Supplemental Nutrition Assistance Program (SNAP), The Emergency Food Assistance Program (TEFAP), The Child and Adult Care Food Program (CACFP), The National School Lunch Program (NSLP), The School Breakfast Program (SBP), The Summer Food Service Program (SFSP), and Women, Infants, and Children (WIC) (USDA, 2020). Table 3 includes the name, acronym, description and those who can receive the benefits from each food assistance program. In addition, local communities have food banks or food pantries that provide individuals with access to free food (Coleman-Jensen, 2018).

Table 3: Federal Food Assistance Programs (USDA, 2021)

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Acronym and Website</th>
<th>Brief Description</th>
</tr>
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<tbody>
<tr>
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<tr>
<td>Supplemental Nutrition Assistance Program (SNAP)</td>
<td><a href="https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program">https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program</a></td>
<td>Provides timely, targeted, and temporary benefits to low-income Americans to buy groceries.</td>
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<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The Emergency Food Assistance Program (TEFAP)</td>
<td><a href="https://www.fns.usda.gov/tefap/emergency-food-assistance-program">https://www.fns.usda.gov/tefap/emergency-food-assistance-program</a></td>
<td>Provides USDA commodities to families in need of short-term hunger relief through emergency food providers like food banks.</td>
</tr>
<tr>
<td>The Child and Adult Care Food Program (CACFP)</td>
<td><a href="https://www.fns.usda.gov/cacfp">https://www.fns.usda.gov/cacfp</a></td>
<td>Provides nutritious meals and snacks to children and adults in designated child and adult care centers.</td>
</tr>
<tr>
<td>Program</td>
<td>Website</td>
<td>Description</td>
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<tr>
<td>------------------------------------------------------------------------</td>
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<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The School Breakfast Program</td>
<td><a href="https://www.fns.usda.gov/sbp/school-breakfast-program">https://www.fns.usda.gov/sbp/school-breakfast-program</a></td>
<td>Provides nutritionally balanced breakfast to qualified children each school day.</td>
</tr>
<tr>
<td>The Summer Food Service Program</td>
<td><a href="https://www.fns.usda.gov/sfsp/summer-food-service-program">https://www.fns.usda.gov/sfsp/summer-food-service-program</a></td>
<td>Provides free meals and snacks to low-income children during the summer months.</td>
</tr>
</tbody>
</table>

**Backpack Programs for Youth**

In addition to food pantries and food assistance programs, other programs have been developed to assist high school youth. Backpack programs are one potential solution for those...
individuals battling food insecurity. Generally speaking, a backpack program is designed to give food to those who are food insecure and are often given to children who receive free or reduced lunch. The idea behind the program is that it provides children with food in a backpack or other vessel to take home with them. The goal is that these foods require no preparation or are easy to prepare by the participants without the assistance of an adult if their parent or guardian is not home. Fram and Frongillo (2018) reported, “One program manual provides the following ‘sample food wish list’ for their BPP: ‘[Canned] Sausage [Products], Canned Tuna or Chicken, Canned Soups, Chili, … [Canned] Pasta Meals, … Tuna/Chicken Lunch Kits, … [Canned Beans with Hot Dogs], Macaroni and Cheese, Canned Soup, Peanut Butter, Vegetables, Pork and Beans Snacks, Peanut Butter/Cheese Crackers, Granola Bars, Fruit Cups, Applesauce, Pudding, Individual Cereal, Instant Oatmeal, Fruit/Cereal Bars.’ Easy-open and easy-preparation foods are justified over healthy staple foods that parents could use to supplement constrained food budgets in ways that promote dietary health, perhaps for the whole family” (Fram & Frongillo, 2018). Another source mentions that the foods in the backpack programs are often have large amount of salt and saturated fat (Stluka, 2018).

Fiese (2017) conducted a study that observed that the implemented backpack program improved food security status of individuals and the individuals’ entire family benefitted from the food in the backpack. The majority of the families involved in the study were SNAP recipients, went to food pantries, or used both SNAP benefits and food pantries in the 30 days leading up to the start of the program. The backpack program was able to move 13% of the participants in the program from food insecurity to food security in two months. The participants recruited for this study received free or reduced-price school lunch, but Fiese (2017) found that
those recruited did not include all individuals who may have benefited from the food over the weekend (Fiese, 2017).

Another proposed solution to disordered eating and food security status is the implementation of a food education program along with food. Heikkilä, Lehtovirta, Autio, Fogelholm, and Valve (2019) explains that implementing a food education program improves the sports nutrition knowledge of athletes within the age range, 16-20 years old. The authors also argue that athletes with nutrition knowledge have improved performance and was successful at combatting disordered eating behaviors (Heikkilä et al., 2019). This study did not detail the effects of the food education program on food insecurity.

Farrell (2013) conducted a study to identify the relationship between food security status and food education. The researchers recognized that individuals living in food insecure households often struggle to choose the nutritionally adequate foods in a store. The education program these researchers implemented involved the participants learning about “healthy food choices, purchases and meals for their families” (Farrell, 2013). The entirety of the program was seven lessons where “food-resource management skills (food-budgeting), nutrition and health practice (food preparation, physical activity) and food safety and storage skills” were taught (Farrell, 2013). Education about how to use resources and stretch the resources were beneficial to participants, but a direct relationship between the impact of the food education and improvement of food security status was not observed (Farrell, 2013).

Stluka (2018) conducted a study that combined a nutrition education and food preparation program that taught participants how to prepare meals at home and the nutrition facts of the food. The foods were sent home with participants in a backpack and were able to implement the lessons taught at home. The researcher concluded that the combination of two similar programs
to the ones discussed in the article would improve food security status and increase access to food (Stluka, 2018).
CHAPTER III: METHODS

This study evaluated the impact of a food education program on youth food security and disordered eating of high school football players in rural, Appalachian Mississippi.

Study Approval

This study was approved by the Institutional Review Board of The University of Mississippi prior to the collection of any data. The Calhoun County School District also approved this study.

Setting of the Study

The Calhoun City School District is located in Calhoun County, Mississippi, which is located in the Appalachian region of the United States. Calhoun County is classified by the ARC as an At-Risk county with distressed areas within it due to its unemployment rates over a three-year period, per capita market income, and poverty rates (ARC, 2019). The poverty rate of Calhoun County was 26.3% at the time of the study (ARC, 2019).

Calhoun County, as noted by the 2020 Rural-Urban Continuum Codes, is classified as a Nonmetro county. It is “completely rural or less than 2,500 urban population, not adjacent to a metro area” (USDA Rural-Urban Continuum Codes, 2020). Of the 14,361 people who live in Calhoun County, 69.7% identify as White, 28.5% identify as Black, and 6.3% identify as Hispanic. 77.5% of the population is a high school graduate or higher and 11.8% has received a bachelor’s degree or higher honor. The median household income is $37,263 (Census Bureau, 2019, p. 1).
Participants

Participants (n=47) were recruited for this study in 2019 after contacting the administration and football coach of the school and were Calhoun City High School football team members in grades nine through twelve. All football team members were males. Parental consent for participation in the research study was required.

Study Design Approach

Procedure

A Pre-Posttest design was utilized for this study. The Pretest survey was administered to participants at the beginning of the academic year during preseason summer football practice for Calhoun City High School. Next, a 12-week, season-long food education program was conducted. This program included weekly food education with practical food-based sport nutrition principles along with food packages to implement the principles at home. The food packages distributed to the participants contained foods considered to be nutritionally adequate and safe. All football players participated in the food education and received food packages regardless of their joining the study or not. At the end of the football season, the Posttest survey was administered to participants.

At both Pre- and Posttest, Youth Food Security was measured using the Connell Self-administered Youth Food Security Module (Table 4) (USDA, 2019).

Table 4: Youth Food Security Module Questions a

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
</table>

a
<table>
<thead>
<tr>
<th>Question</th>
<th>A lot</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you <strong>worry</strong> whether food at home would run out before your family got money to buy more?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the food that your family bought <strong>run out</strong>, and you didn’t have money to get more</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the meals only include a few kinds of <strong>cheap foods</strong> because your family was running out of money to buy food?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How often were you not able to eat a <strong>balanced meal</strong> because your family didn’t have enough money?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you have to <strong>eat less</strong> because your family didn’t have enough money to buy food?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the size of your meals <strong>been cut</strong> because your family didn’t have enough money to buy food?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you have to <strong>skip a meal</strong> because your family didn’t have enough money to buy food?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Were you <strong>hungry</strong> but didn’t eat because your family didn’t have enough food?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Did you not eat for a whole day because your family didn’t have enough money to buy food?

Disordered Eating was measured using the SCOFF 5-item scale (Table 5) (Morgan, Reid, & Lacey, 2000).

Table 5: SCOFF 5-item for disordered eating

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you make yourself sick because you feel uncomfortably full?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you worry that you have lost control over how much you eat?</td>
<td>Yes</td>
</tr>
<tr>
<td>Have you recently lost more than 14 pounds in a 3-month period?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you believe yourself to be fat when other say you are too thin?</td>
<td>Yes</td>
</tr>
<tr>
<td>Would you say that food dominates your life?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Statistical Analysis

Surveys were tabulated using IBM SPSS software program (version 22, Armonk, New York). The responses from the Connell Self-Administered Youth Food Security Module Pre- and Posttest were scored using recommended scoring methods (USDA, 2020). A “0” was given to individuals who answered “Never,” a “1” was given to individuals who answered “Sometimes,” and a “2” was given to those who answered, “A lot.” Affirmative responses (“A lot” or “Sometimes”) were totaled, using the following procedures: 1) 0 affirmative responses = High
food security; 1 affirmative response = Marginal food security; 2-5 affirmative responses = Low food security; 6-9 affirmative responses = Very low food security; 2) 0-2 affirmative responses = food secure; 3-10 affirmative = food insecure; and 3) 0 affirmative responses = fully food secure; 1-10 affirmative responses = not fully food secure.

The responses from the SCOFF questionnaire for disordered eating were scored using the recommended scoring procedure (Morgan, Reid, & Lacey, 2000). A “1” was given to individuals who answered “Yes” and a “0” was given to individuals who answered “No.” Affirmative responses (“Yes”) were summed to compute an eating disorder score, and two affirmative responses were considered consistent with disordered eating (Morgan, Reid, & Lacey, 2000).

As summarized in Table 6, Pearson Chi-Square analyses were used to assess differences in Youth Food Security status (food secure versus food insecure individuals; fully food secure versus not fully food secure individuals) from pre- to post-participation in a food education program. Similarly, independent t-test analysis was used to assess for change in eating disorder score from pre- to post-food education program.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Statistical Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the impact of a food education program on youth food security status of</td>
<td>Pearson Chi-Square</td>
</tr>
<tr>
<td>male high school football players in rural, Appalachian Mississippi?</td>
<td></td>
</tr>
<tr>
<td>What is the impact of a food education program on the disordered eating score of</td>
<td>Independent t-test</td>
</tr>
<tr>
<td>male high school football players in rural, Appalachian Mississippi?</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Research Study Questions and the Associated Statistical Procedures
CHAPTER IV: RESULTS

This study evaluated the impact of a food education program on youth food security and disordered eating of male high school football players in rural, Appalachian Mississippi.

Characteristics of Study Participants

Participants were recruited in July 2019 from the Calhoun County High School football team. The average age of participants was 16.0 ± 1.2 years, and all participants identified as male (n=26/26, 100%). The majority of participants identified as African American (n=17/26, 65.4%), were not Hispanic (n=23/24, 95.8%), and were in the eleventh grade (n=10/26, 38.5%). The demographics of the participants are shown below in Table 7. The total number of participants differs in the Characteristic section, “Hispanic,” due to two participants not providing an answer.

Table 7: Demographic Characteristics of Male High School Football Players in Rural, Appalachian Mississippi Participating in a Food Education Program

<table>
<thead>
<tr>
<th>Characteristic (n=26)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>17/26</td>
<td>65.4</td>
</tr>
<tr>
<td>White</td>
<td>8/26</td>
<td>30.8</td>
</tr>
<tr>
<td>Other</td>
<td>1/26</td>
<td>3.8</td>
</tr>
<tr>
<td>Hispanic (n=24)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Youth Food Security and Disordered Eating

The majority of the participants was food secure prior to and after implementing the food education program. Table 8 shows the Youth Food Security status of all participants (n=26).

Table 8: Youth Food Security Status (Pre- and Post-survey) of Male High School Football Players Participating in a Food Education Program in Rural, Appalachian Mississippi

<table>
<thead>
<tr>
<th>Youth Food Security Category</th>
<th>Pre-Educational n=26</th>
<th>Pre-Educational %</th>
<th>Post-Educational n=26</th>
<th>Post-Educational %</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Food</td>
<td>17</td>
<td>65.4</td>
<td>22</td>
<td>84.6</td>
<td></td>
</tr>
<tr>
<td>Marginal</td>
<td>4</td>
<td>15.4</td>
<td>2</td>
<td>7.7</td>
<td>N/A</td>
</tr>
<tr>
<td>Food Security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Food Security</td>
<td>3</td>
<td>11.6</td>
<td>0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Very Low Food Security</td>
<td>2</td>
<td>7.7</td>
<td>2</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Youth Food Security Category</th>
<th>Pre-Educational</th>
<th>Post-Educational</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=26</td>
<td>%</td>
<td>n=26</td>
<td>%</td>
</tr>
<tr>
<td>Food Security (High and Marginal Food Security)</td>
<td>21</td>
<td>80.8</td>
<td>24</td>
</tr>
<tr>
<td>Food Insecurity (Low and Very Low Food Security)</td>
<td>5</td>
<td>19.2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Youth Food Security Category</th>
<th>Pre-Educational</th>
<th>Post-Educational</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=26</td>
<td>%</td>
<td>n=26</td>
<td>%</td>
</tr>
</tbody>
</table>
At pre and post, respectively, 1/26 (3.8%) and 3/26 (11.5%) participants had a disordered eating score consistent with disordered eating. The majority of participants had a score that was not consistent with disordered eating.

**Impact of a Food Education Program on Youth Food Security and Disordered Eating**

As shown in Table 8, Youth Food Security significantly improved from pre- to post-educational intervention, when comparing youth living in food secure compared to food insecure homes (p=.003) and when comparing youth living in fully food secure compared to not fully food secure homes (p=.003). As summarized in Table 8, three participants moved from food insecurity to food security, and five participants moved from not fully food secure to fully food secure at the conclusion of the program.
Disordered eating score did not significantly change from pre- (0.31 ± 0.68) to post- (0.42 ± 0.95) educational intervention (p=.327).
DISCUSSION AND CONCLUSIONS

This study evaluated the impact of a food education program on youth food security and disordered eating of male high school football players in rural, Appalachian Mississippi. This study showed that participation in a food education program that provided food packages for participants improved food security status, but it did not improve disordered eating score of participants.

Impact of Food Education on Food Security Status

The food education program supplemented with the food packages positively impacted the food security status of the Calhoun City High School male football players. Youth food security (food secure/food insecure) significantly improved from pre- to post-intervention (p=.003). Also, Youth food security (fully food secure/not fully food secure) significantly improved from pre- to post-intervention (p=.003).

Previous research has shown that food distribution and food education separately impact the food security status of individuals. As previously noted, the program associated with this thesis provided sport-focused food education and food packages with foods to implement the sport nutrition principles at home. Fiese (2017) conducted a study to assess the impact of backpack programs on food insecure households. This study involved the distribution of nutritionally adequate foods to children that was ultimately used by the child’s household. The researchers did not identify the specific foods distributed to participants, but other studies identify a suggested list of foods that were culturally appropriate for that community and easy to prepare by youth. This list includes but is not limited to, “[Canned] Sausage [Products], Canned
Tuna or Chicken, Canned Soups, Chili, … [Canned] Pasta Meals, … Tuna/Chicken Lunch Kits, … [Canned Beans with Hot Dogs], Macaroni and Cheese, Canned Soup, Peanut Butter, Vegetables, Pork and Beans Snacks, Peanut Butter/Cheese Crackers, Granola Bars, Fruit Cups, Applesauce, Pudding, Individual Cereal, Instant Oatmeal, Fruit/Cereal Bars.’’ Easy-open and easy-preparation foods are justified over healthy staple foods that parents could use to supplement constrained food budgets in ways that promote dietary health, perhaps for the whole family” (Fram & Frongillo, 2018). Fiese (2017) found that the presence of the backpack program food allowed 13% of families to move from low food insecure status to food secure status (Fiese, 2017). Participants reported that food education and food usage education would be beneficial. Children did not receive food education from the backpack program. Farrell (2013) found that food education significantly impacts the food security status of individuals. The food education program these researchers implemented involved the participants learning about “healthy food choices, purchases and meals for their families” (Farrell, 2013). The program consisted of seven lessons where “food-resource management skills (food-budgeting), nutrition and health practice (food preparation, physical activity) and food safety and storage skills” were taught (Farrell, 2013). However, the researchers concluded that the direct impact of the food security status of the participants was instead due to education about how to use the food and resources was more beneficial. This study involved individuals who were categorized as marginally food secure, received SNAP benefits, often struggled to purchase foods like fruits and vegetables throughout the duration of a month, and were not supplemented with nutritionally adequate foods (Farrell, 2013). Stluka (2018) conducted research in efforts to find the impact of a food education program and a backpack program on food security status. Participants were taught the nutritional benefits of food as they learned to prepare meals with the foods they were learning about. These
foods were then sent home with the participants to practice at home. Stluka (2018) concluded that the combination of the two resources significantly impacted food security status.

The study associated with this thesis involved the teaching food-based sport nutrition principles and the distribution of food packages each week to implement the principles at home. Our study did not limit the distribution of food packages to only those who completed the study (parental and youth surveys), but instead was given to all 47 members of the football team. Implementing a food education program was shown to significantly impact the food security status of participants (Farrell, 2013). Food distribution to participants was shown to significantly impact the food security status of participants (Fiese, 2017). The combination of a food education program and food distribution to participants was shown in previous studies and in this study to improve the food security status of participants (Stluka, 2018).

Impact of Food Education on Disordered Eating

The food education program did not significantly impact the disordered eating scores of the participants (p=.327). At pre and post, respectively, 1/26 (3.8%) and 3/26 (11.5%) participants had a disordered eating score consistent with disordered eating. The majority of participants had a score that was not consistent with disordered eating.

Poll et al. (2018) conducted a cross sectional study of collegiate athletes and concluded there was direct correlation between food security status and disordered eating. Previous research has shown that food security status and disordered eating behaviors, like binge eating and overeating, have a significant correlation (Stinson et al., 2018; Tester, 2016; Hazzard, 2020). Disordered eating in athletes has been heavily studied, but research for disordered eating in male athletes, in particular, has been studied less.
Limitations

There were limitations to this study. One limitation is the sample size; this study included data from 26 participants. This small sample size compromises the results observed, and the validity of the conclusions drawn from the results is questionable. The sample size may appear small, but the completion rate for the study was 55.3% (n=26/47). However, despite the excellent response rate, the participants may not be representative of the team or youth playing high school football, limiting the generalizability of the results. In efforts to improve this limitation in future studies, an incentive could be provided to participants to improve the number of completed surveys, the study could be implemented at other high schools in the rural, Appalachian region of Mississippi, and more male sports teams could be included.

Another potential limitation of the study associated with this thesis was the measure utilized for disordered eating. While the eating disorder score was assessed using a validated measure (Morgan, Reid, & Lacey, 2000), the study associated with this thesis did not include questions pertaining to food hoarding or similar behaviors previously observed in male collegiate athletes (Poll et al., 2018). Examples of pretest-posttest questions are included in Table 9 below.

Table 9: Potential Disordered Eating Questions for Further Research

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIOR TO starting football practice in late July, did you ever hide or keep food secretly in your backpack, bedroom, car or any other place so that you would have food to eat?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
SINCE STARTING football practice in late July, did you ever hide or keep food secretly in your backpack, bedroom, car or any other place so that you would have food to eat?  

PRIOR TO starting football practice in late July, did you ever save food from your school meals during the week to eat AFTER SCHOOL?

SINCE STARTING football practice in late July, did you ever save food from your school meals during the week to eat AFTER SCHOOL?

PRIOR TO starting football practice in late July, did you ever save food from your school meals during the week to eat ON WEEKENDS?

SINCE STARTING football practice in late July, did you ever save food from your school meals during the week to eat ON WEEKENDS?

PRIOR TO starting football practice in late July, did you ever ask a teacher, coach, or friend for money to buy food?

SINCE STARTING football practice in late July, did you ever ask a teacher, coach, or friend for money to buy food?

PRIOR TO starting football practice in late July, did you ever ask a teacher, coach, or friend for food?

SINCE STARTING football practice in late July, did you ever ask a teacher, coach, or friend for food?
Implications for Further Research and Programs for Youth

The study associated with this thesis utilized the Fueling Fitness food education program. That program combined food education that taught participants about nutritionally, adequate meals and snacks to aid sport performance and provided food packages to implement those skills at home. Further research on the impact of a food education program with food packages on food security status is recommended despite the results of this study. The inclusion of other sports at Calhoun City High School followed by inclusion of other high schools in rural, Appalachian Mississippi would be beneficial to increase the generalizability of the results and to further understand the impact of the program on food security status.

Implementing education that includes food preparation and food management strategies is recommended for future research. Halfacre, Chang, Roseman & Holben (2017) assessed the relationship of food insecurity and produce consumption to food preparation ability and financial strain among university students. Halfacre et al., (2017) and others concluded that promoting students’ ability to prepare their own meals may be a viable solution to combat food insecurity. While the study associated with this thesis examined high school students, food preparation ability may be a potential for avenue for further research to improve food insecurity. Similarly, Stluka (2018) combined a nutrition education and food preparation program that taught participants how to prepare meals at home in tandem with a backpack program, warranting exploration of the role of food preparation to improve food security among high school athletes participating in a food education and supplemental foods program, similar to a program associated with this study (Stluka, 2018).
Disordered eating behaviors, as well as their relationship with food security and food education, warrants further exploration. Future research should consider, as noted in the limitations section, including questions about food hoarding and other behaviors that relate to disordered eating, especially among athletes (Poll et al., 2018). As previously noted, the inclusion of other sports at Calhoun City High School followed by inclusion of other high schools in rural, Appalachian Mississippi would be beneficial to further understand the impact of a food education program with supplemental foods on disordered eating and to increase the generalizability of the results.

Finally, both food insecurity and disordered eating could be explored among female athletes. Food insecurity and its relationship to disordered eating has been shown to especially common among adult females, supporting this avenue of research (Holben & Berger-Marshall, 2017).
APPENDIX A

Table 1: USDA Household Food Security Status Survey Questions

<table>
<thead>
<tr>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. “We worried whether our food would run out before we got money to buy more.” Was that often, sometimes, or never true for you in the last 12 months?</td>
</tr>
<tr>
<td>2. &quot;The food that we bought just didn't last and we didn't have money to get more.” Was that often, sometimes, or never true for you in the last 12 months?</td>
</tr>
<tr>
<td>3. &quot;We couldn't afford to eat balanced meals.&quot; Was that often, sometimes, or never true for you in the last 12 months?</td>
</tr>
<tr>
<td>4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)</td>
</tr>
<tr>
<td>5. (If yes to question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?</td>
</tr>
<tr>
<td>6. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)</td>
</tr>
<tr>
<td>7. In the last 12 months, were you ever hungry, but didn't eat, because there wasn't enough money for food? (Yes/No)</td>
</tr>
<tr>
<td>8. In the last 12 months, did you lose weight because there wasn't enough money for food? (Yes/No)</td>
</tr>
</tbody>
</table>
9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

10. (If yes to question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

(Questions 11-18 were asked only if the household included children age 0-17)

11. "We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food." Was that often, sometimes, or never true for you in the last 12 months?

12. "We couldn't feed our children a balanced meal, because we couldn't afford that." Was that often, sometimes, or never true for you in the last 12 months?

13. "The children were not eating enough because we just couldn't afford enough food." Was that often, sometimes, or never true for you in the last 12 months?

14. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food? (Yes/No)

15. In the last 12 months, were the children ever hungry but you just couldn't afford more food? (Yes/No)

16. In the last 12 months, did any of the children ever skip a meal because there wasn't enough money for food? (Yes/No)

17. (If yes to question 16) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

18. In the last 12 months did any of the children ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

USDA, 2020
A “0” was given to individuals who answered “Never,” a “1” was given to individuals who answered “Sometimes,” and a “2” was given to those who answered, “A lot.” Affirmative responses (“A lot” or “Sometimes”) were totaled, using the following procedures: 1) 0 affirmative responses = High food security; 1 affirmative response = Marginal food security; 2-5 affirmative responses = Low food security; 6-9 affirmative responses = Very low food security; 2) 0-2 affirmative responses = food secure; 3-10 affirmative = food insecure; and 3) 0 affirmative responses = fully food secure; 1-10 affirmative responses = not fully food secure.
APPENDIX B

Table 2: Connell Self-administered Youth Food Security Module

<table>
<thead>
<tr>
<th>Questions:</th>
<th>Responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you <strong>worry</strong> whether food at home would run out before your family got money to buy more?</td>
<td>A lot       Sometimes    Never</td>
</tr>
<tr>
<td>Did the food that your family bought <strong>run out</strong>, and you didn’t have money to get more</td>
<td>A lot       Sometimes    Never</td>
</tr>
<tr>
<td>Did the meals only include a few kinds of cheap foods because your family was running out of money to buy food?</td>
<td>A lot       Sometimes    Never</td>
</tr>
<tr>
<td>How often were you not able to eat a balanced meal because your family didn’t have enough money?</td>
<td>A lot       Sometimes    Never</td>
</tr>
<tr>
<td>Did you have to <strong>eat less</strong> because your family didn’t have enough money to buy food?</td>
<td>A lot       Sometimes    Never</td>
</tr>
<tr>
<td>Has the size of your meals <strong>been cut</strong> because your family didn’t have enough money to buy food?</td>
<td>A lot       Sometimes    Never</td>
</tr>
</tbody>
</table>
Did you have to **skip a meal** because your family didn’t have enough money to buy food?

<table>
<thead>
<tr>
<th>A lot</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

Were you **hungry** but didn’t eat because your family didn’t have enough food?

<table>
<thead>
<tr>
<th>A lot</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

Did you not eat for **a whole day** because your family didn’t have enough money to buy food?

<table>
<thead>
<tr>
<th>A lot</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>

---

*a USDA, 2004*

**Scoring Method for Youth Food Security**

Surveys were tabulated using IBM SPSS software program (version 22, Chicago, Illinois). The responses from the Connell Self-Administered Youth Food Security Module Pre- and Posttest were scored using recommended scoring methods (USDA 2019). A “0” was given to individuals who answered “Never,” a “1” was given to individuals who answered “Sometimes,” and a “2” was given to those who answered, “A lot.” Affirmative responses (“A lot” or “Sometimes”) were totaled, using the following procedures: 1) 0 affirmative responses = High food security; 1 affirmative response = Marginal food security; 2-5 affirmative responses = Low food security; 6-9 affirmative responses = Very low food security; 2) 0-2 affirmative responses = food secure; 3-10 affirmative = food insecure; and 3) 0 affirmative responses = fully food secure; 1-10 affirmative responses = not fully food secure.
APPENDIX C

Table 3: SCOFF 5-item Disordered Eating Questions

<table>
<thead>
<tr>
<th>Questions:</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you make yourself sick because you feel uncomfortably full?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you worry that you have lost control over how much you eat?</td>
<td>Yes</td>
</tr>
<tr>
<td>Have you recently lost more than 14 pounds in a 3-month period?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you believe yourself to be fat when other say you are too thin?</td>
<td>Yes</td>
</tr>
<tr>
<td>Would you say that food dominates your life?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

b Morgan, Reid, & Lacey, 2000

Scoring Method for Disordered Eating

The responses from the SCOFF questionnaire for disordered eating were scored using the recommended scoring procedure (Morgan, Reid, & Lacey, 2000). A “1” was given to individuals who answered “Yes” and a “0” was given to individuals who answered “No.” Affirmative responses (“Yes”) were summed to compute an eating disorder score, and two affirmative responses were considered consistent with disordered eating (Morgan, Reid, & Lacey, 2000).
REFERENCES


https://pdfs.semanticscholar.org/7908/93da3b0a3a225cd3c002fc94c96abef16962.pdf


https://doi.org/10.1016/j.jhealeco.2009.06.012


https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6770376/.


**Key Statistics & Graphics.** USDA ERS - Key Statistics & Graphics.


https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070794/.


https://doi.org/10.1093/jn/120.suppl_11.1544

Piontak, J. R., & Schulman, M.D., *Food Insecurity in Rural America* (2014)

https://journals.sagepub.com/doi/pdf/10.1177/1536504214545766


https://doi.org/10.1002/eat.22990


http://www.fao.org/3/Y5061E/y5061e08.htm


*Rural Health Information Hub*. Rural health for Mississippi introduction.

https://www.ruralhealthinfo.org/states/mississippi.

*Rural Poverty & Well-Being. USDA ERS - Rural Poverty & Well-Being.*


*U.S. Census Bureau QuickFacts: Calhoun County, Mississippi. Census Bureau QuickFacts. [https://www.census.gov/quickfacts/fact/table/calhouncountymississippi/PST120219](https://www.census.gov/quickfacts/fact/table/calhouncountymississippi/PST120219)*.
