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## Low Academic Outcomes: A Result of Food Insecurity and Student Mental Health During COVID19

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Low Academic Outcomes: A Result of Food Insecurity and Student Mental Health  
During COVID-19

by

Kristen Riley Cole

A Thesis  
Submitted to the Honors College of  
The University of Southern Mississippi  
in Partial Fulfillment  
of Honors Requirements

May 2022



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## ABSTRACT

Food insecurity has significantly increased throughout the United States as a result of the COVID-19 pandemic. Many schools switched to remote learning and children lost access to free school meals, affecting them psychologically and academically. This study examined the relationship between food insecurity and low academic outcomes, accounting for student mental health, such as anxiety, depression, and ADHD, as well as parental involvement as a possible protective factor against mental health. The current study administered a survey through Amazon's MTurk to reach a diverse group of participants across the United States. Data analysis from the study can conclude that food insecurity has a significant effect on student mental health, as well as student GPA; however, parental involvement has no effect on improving students' mental health and mediating mental health and GPA. This study supports numerous research on the effects of food insecurity on mental health but contributes new findings to the effects of COVID-19 on student mental health and GPA. Higher levels of food insecurity lead to higher levels of anxiety, depression, inattention, and/or hyperactivity, in turn resulting in a lower overall GPA. Parental involvement moderated the relationship between anxiety/depression and inattention but did not moderate the relationship between hyperactivity and GPA. These results provide significant implications for parents, teachers, school districts, and lawmakers to find ways to address food insecurity. Policies and programs implementing a take-home meal system, or ways of distributing food to those students affected by COVID-19 may be particularly effective. COVID-19 notwithstanding, use of these programs may increase academic performance among those who struggled with food insecurity before and following COVID-19.

**Keywords:** *food insecurity, COVID-19, student mental health, academic success, pandemic, parental involvement, ADHD, depression, anxiety, inattention, hyperactivity*

## **DEDICATION**

I am dedicating this thesis to my parents, Kris and Racheal Cole. Without the two of you, I would not be where I am today. Thank you for your constant support, encouragement, and for always expecting me to do my best. You mean the world to me. I love you both

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## LIST OF ABBREVIATIONS

ADHD	Attention Deficit Hyperactivity Disorder
COVID-19	Coronavirus Pandemic 2019
FAO	Food and Agriculture Association
FDA	Food and Drug Administration
GPA	Grade Point Average
MTurk	Amazon Mechanical Turk
NIHQ	National Institute for Children's Health Quality
NRC	National Research Council
US	United States

## CHAPTER I: INTRODUCTION

Food insecurity is a public health problem that is associated with children's academic and socioemotional functioning. Food insecurity is defined as "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (Hamilton, 1997, pg. 50). Food insecurity has long been a public health problem in the United States and increased substantially during the COVID-19 pandemic. According to the COVID Impact Survey, food insecurity has increased by 130% since 2018. One of the more prominent reasons food insecurities has increased is that nearly 93% of children in America experienced new online learning and lost access to school meals (US. Census, 2020). Food insecurity poses several problems to children as those who experience greater food insecurity are at increased risk for academic, emotional, and cognitive problems (Ke, 2015; Thomas, 2019).

Among the deleterious outcomes associated with food insecurity, mental health problems are particularly salient (Chilton, 2007, Portela-Parra, 2019; Thomas, 2019). Food insecurity has been associated with symptoms of anxiety, depression and attention deficit and hyperactivity disorder (ADHD) (Men, et al., 2021; Myers, 2020). Such mental health problems pose additional risk among children who are food insecure, as it has been well established that mental health problems have a profound impact on academic achievement. The elevated mental health problems reported during COVID-19 as a consequence of greater food insecurity may play an important role in understanding 2 student academic achievement during the pandemic. Academic achievement is a complex and multifaceted construct including grade point average, standardized test scores, and

desire to pursue a college education. Mental health problems may impact student's academic success and achievement via increased stress, compromised immune functioning, poor self-efficacy skills, low motivation, and poorer cognitive functioning (Brannlund, et al., 2017; Martinez, 2020; Mundy, et. Al., 2017).

Despite these findings there is little research about the relationship between child mental health and academic outcomes among children who come from food insecure households. Prior research has noted that mental health problems mediate the relationship between food insecurity and academic outcomes among college students (Martinez, 2020; Phillips, 2018), so it is plausible that we would expect similar effects among children during a global pandemic. Therefore, the goal of the current study to examine mental health problems, including symptoms of depression, anxiety and ADHD, as mediators linking food insecurity during the COVID-19 pandemic to the academic achievement of children in grades 2nd through 5th. Children at this age are better able to self-regulate, understand the importance of education, show independence in completion of routines, feel a strong need for achievement, and begin more challenging work in school that requires more thought (Mullen, G., 2019; Wisconsin Child Welfare Training System, 2012).

The relationship between student mental health problems and academic achievement is likely to be influenced by a variety of factors and parental involvement may be one such factor. Students suffering from mental health problems stemming from 4 food insecurity may experience lower academic outcomes; however, parental involvement could possibly be a protective factor. A promising way of improving a students' educational outcome is parental educational involvement, or parents' active

participation in the educational lives of their children (Benner, 2016). When parents encourage their children to do their best in school, stress the importance of education, stay involved in the schools through parent/teacher communication, help their children with their homework and ask them about their day, and overall remain involved in the child's education as a whole, their children will understand the importance of their academic success and strive to increase achievement (Engin, 2020; Ntekane 2018; Samoray, 2019). Using a moderated mediation analysis, this study examined if symptoms of depression, anxiety, and ADHD mediate the association between food insecurity and student grade point average. Parental involvement as a moderator of the relationship between each of the mental health problems and student grade point average to determine if the indirect effects of food insecurity on GPA through mental health were conditional based on levels of parental involvement.



## CHAPTER II: LITERATURE REVIEW

### Food Insecurity

Food insecurity may negatively impact students and is distinguished from direct hunger. Food insecurity does not always mean the people in the household are hungry, but if there is a lack of access to nutrient dense foods then the household is considered food insecure (FAO, 2003; Hamilton, 1997). One of the fundamental conceptual issues surrounding food insecurity and hunger is determining whether food insecurity and hunger represent unique, but related constructs or represent a singular construct. Hunger has been defined as, “the uneasy or painful sensation caused by a lack of food, the recurrent and involuntary lack of access to food” (NRC; National Research Council, 2006, p. 47). On the other hand, the Food and Agriculture Organization (FAO) defines food insecurity as “not having adequate physical, social, or economic access to food for an active and healthy life” (FAO, 2003, Ch.2). One of the primary conceptual differences between hunger and food insecurity is that hunger can be a short-term feeling, but food insecurity tends to be more chronic and may extend over longer periods of time (Barrett et al., 2013). Hunger also seems to be more of a physiological experience or feeling, whereas food insecurity is the result of an absence of adequate nutrition. Often times the lack of adequate nutrition is the result of structural problems in larger social systems rather than individual or familial based issues. For example, food insecurity can manifest as families having to use inconsistent and unreliable public transportation to get groceries because high quality foods are not available within a reasonable distance to travel. This is an example of living in a “food desert” where despite availability of food, the available food is unhealthy, high in preservative, sugar, fat, and other nutrients that should only be

consumed in moderation rather than the foundation of their diet. According to the Food and Agriculture Association, when a person is hungry for an extended period and does not consume a sufficient number of calories on a regular basis, hunger becomes chronic, which is also referred to as undernourishment (FAO, 2021). The sensation of hunger is not classified as food insecurity because it is not always a result of an extended lack of access to quality foods. An additional conceptual difference between food insecurity and hunger is that hunger is typically more temporary, whereas food insecurity tends to be a chronic experience due to factors outside the family's control reflecting possible longterm hunger if there is a lack of calories, and nutrient inadequacy. Many articles use hunger and food insecurity interchangeably; however, hunger is a different concept that should be measured as such (National Research Council, 2006).

### **COVID-19 Impact on Families and Students**

The COVID-19 pandemic has had a profound impact on family life and created a large amount of uncertainty across the globe and problems obtaining basic human necessities. Among the most pressing issues potentiated by the pandemic is food insecurity. For example, nearly one in five households with children under the age of 12 experienced food insecurity as a result of the COVID-19 pandemic (Bauer, 2020). Further, the COVID-19 pandemic has tripled food insecurity among households with children in the United States (Fitzpatrick, 2020; Niles, 2020; Schanzebach, 2020). The increases in the number of food insecure households can be attributed to a variety of factors including job loss, furlough, and reduced working hours (Lund, 2020). In addition to food insecurity being caused by financial issues, it may also exacerbate

existing structural issues (e.g., lack of transportation to access food or greater competition for more limited food resources). In order to feed their families parents that no longer have a steady income have resulted in visiting food banks. For reference, during the pandemic food banks across the country report skyrocketing demand, with upwards of 30% being firsttime users of the charitable food system (Nataga, 2020).

### **Conceptual Background on Food Insecurity and Academic Outcomes**

The relationship between students experiencing food insecurity and poorer academic success among elementary aged children is evident in the United States and has been particularly salient during COVID-19. Multiple studies have found that food insecurity is associated with a lower GPA and academic success (Bruening et al., 2018; Payne-Sturges et al., 2017; Woerden et al., 2019). According to the Institute of Medicine (2014), lower levels of academic success have been partially attributed to poor diet. Proper minerals, vitamins, and nutrients are vital to student academic outcomes. The human brain needs sufficient energy to perform the cognitive functions (e.g., critical thinking) associated with academic success (Woodhouse, 2012). Although children living in food-insecure households may still meet daily calorie requirements, the foods consumed are low in nutritional value. On the other hand, if the body is not getting sufficient calories or nutrition, the body can go into survival mode, only sending available calories to vital organs to maintain functioning. This could mean that the brain could only be using calories to survive, instead of performing at optimal levels. The neurons in the brain feed off the macronutrients such as carbohydrates, proteins, and fats

consumed daily required for academic success (Gutierrez et al., 2013; Jirout et al., 2019; Kim et al., 2017).

The underlying biological dysfunction commonly found in children living in food insecure households may increase mental health problems that leave food insecure children at risk for poorer academic performance. Studies have consistently shown that food insecurity is one of the most powerful predictors of psychiatric and functional problems in children (Jackson et al., 2019; Poole-Di Salvo et al., 2016; Rutter, 1977). Students experiencing food insecurity might be more likely to have lower academic scores because of mental health problems limiting their full potential. Food insecurity within household increases the risk for mental health problems such as anxiety, depression, and inattention (Ke, 2010; Melchoir, 2012; Perez, 2012). The primary way in which food insecurity can manifest mental health problems is through altered physiological functioning potentiated by poor diet. For example, in a food-insecure household, the child's diet consists of foods high in refined sugar, sodium, and fat because this food is cheaper to buy in bulk. For example, food-insecure households buy less fruit, protein, seafood, and plant protein compared to food-secure households. (Gregory et al., 2019). In another study, participants restrict the quality and quantity of food as a strategy to save money (Zepeda, 2018). Children who consume high levels of sugar, sodium, and fat lack vital nutrients that come from fruits, vegetables, and protein sources, such as red meats, fish, chicken which are vital for psychological wellbeing and mental health (Rosen et al., 2021).

More specifically, consuming large amounts of refined sugars, sodium, and fat, and not enough iron rich sources may contribute to a child's hyperactivity and inattention

(Melchior, 2012). Anemia is a disorder which is principally characterized by a decline in the concentration of circulating erythro-cytes, or blood hemoglobin, and concomitant impairment of oxygen delivery to meet the body's physiological needs. Anemia is thought to be caused by nutritional deficiencies of iron, folate, and vitamin B12 (McLean, 2005). Anemia results has numerous psychological and academic consequences including a decreased ability to focus, poorer memory, lower standardized test scores, inability to complete tasks in an appropriate time frame, and contributes to lower GPA (University of California Davis, 2021). In fact, children living in food-insecure households are more than 30% more likely to develop anemia (Currie, 2005). Indeed, research has supported the conceptual link between food insecurity and ADHD. Children living in food insecure households often lack a nutritionally balanced diet which may enhance the likelihood of developing ADHD symptoms (Lu, 2019; Rongstad, 2018; Yavari, 2018). For example, one study found evidence that food insecurity has a positive relationship with ADHD symptoms such that greater food insecurity is linked to greater ADHD symptoms (Lu, 2019). In another study, it was found that food insecurity was associated with ADHD symptoms and the authors recommended that doctors should consider food insecurity as a contributing factor for ADHD (Yavari, 2018). Despite these two studies finding that food insecurity is linked to ADHD symptoms, it is unclear if the ADHD symptoms possibly caused by food insecurity have a significant effect on academics. Despite an association between food 15 16 insecurity and ADHD symptoms, the implications of elevated ADHD symptoms among children remain unclear and may be heightened during a pandemic. Numerous studies have also linked a poor diet and nutrient deficiencies common in food insecurity to depressive symptoms. Diets that are high in saturated fats

and refined carbohydrates are directly associated with depressive symptoms (O'Neil, 2014). Diets rich in Omega-3 Fatty Acids, minerals such as iron and zinc, and vitamins such as B-12 play an important role in the prevention and treatment of depression (Khalid, 2016). More specifically, amino acids that come from healthy diets directly contribute to the production of serotonin. When the diet lacks these essential amino acids, one is more likely to suffer from depression (Friedman, 2018). Depression in those living in food insecure households may be partially attributed to lacking vital nutrients for proper brain functioning, or from constant stress and worry over food availability (Cofino et al., 2019; Jung et al., 2019; Koury et al., 2020). Research shows food insecurity is highly associated with depressive symptoms in mothers; however, there is little research about the effects on children, so it is plausible that students in food insecure households may also manifest depressive symptoms. Children living in food insecure households may also experience higher levels of anxiety. This anxiety could be caused by several reasons, one of which is parental anxiety. Children are more likely to develop anxious and worried thoughts if they observe this behavior in their parents (McLaughlin et al., 2012; Zhu et al., 2019). Elevated levels of anxiety could possibly occur through worrying about the next meal the student will have or through parental behavior about food related issues such as rationing nutritious food, complaining about the lack of adequate food, or showing signs of stress while grocery shopping. Additionally, there are biological explanations linking food insecurity to anxiety. Research has also shown that certain nutritional deficiencies of Vitamin B12, zinc, and Omega-3 can lead to higher levels of anxiety (Anbari-Nogyni et al., 2020; Larrieu et al., 2018; Sarahswathy et al., 2019). There is not a significant amount of research available to conclude that children

living in food insecure households will likely develop anxiety; however, research has shown that parental anxiety about food insecurity, along with nutritional deficiencies, may cause anxiety in children (Connell et al., 2005). In accordance with the previous mentioned conceptual discussion, there are theoretical models that can also explain the possible associations between food insecurity, mental health, and academic performance.

### **Child Mental Health and Academic Outcomes**

Symptoms of depression, anxiety, and ADHD may have a significant impact on children's academic achievement. Depressive symptoms can impair children's self-efficacy and motivation for academic success (Bandura, 1999). One of the most common depressive symptoms is low motivation, which in turn can negatively impact a child's academic outcomes. For example, a study found that children who observe depressive symptoms resulted in a half a letter grade drop in GPA compared to those who did not (Hysenbegasi, 2005). Children with higher levels of depressive symptoms have difficulty controlling negative emotions and consequently suffer academically (Ashiabi, 2008). Student mental and academic wellbeing is dependent upon a healthy diet and sufficient calories (Ke, 2015; Melchior, 2012; Perez-Escamilla' 2015). Likewise, the anxiety caused by the issue of food insecurity may distract the student from being able to involve themselves in the classroom. This could look like disinterest in school, poor relationships with peers and teachers, or lack of engagement. Anxiety can also cause poorer sleep quality, which can result in a student falling behind because they have a more difficult time learning, problem-solving, and listening (Chorney et al., 2008; Pagel et al., 2007). Students have a higher risk of developing anxiety coming from low-income

families (Najman et al., 2010; Weng, 2012). This might be caused by anxiety from worrying about food, nutritional deficiencies, or unstable environments. Difficulty concentrating in school through anxiety related reasons can lead to poorer grades, affecting the student's overall academic success due to the anxiety reducing student mental functioning. ADHD can negatively impact a student's education in many ways. Cognitive skills may be impacted by one or both symptoms of ADHD which are inattention, hyperactivity, impulsiveness (Arnold, et al., 2020). Studies have shown that students diagnosed with ADHD are associated with more impairment in reading, writing, and math, as well as social relationships, peer activities, and behavior in the classroom (Arnold, et al., 2020; Tamm, et al., 2021). These impairments may be a result of the student's difficulty sitting still, paying attention, and remaining focused. As a result of the ADHD symptoms potentiate difficulty remaining attentive and focused, children may only absorb some of the material that their teachers are providing. Despite the academic problems that children with depressive, anxiety, and ADHD have, not all children who experience such symptoms suffer poor academic performance, so it is important to identify protective factors that may discriminate those who struggle academically versus those who do not.

### **Parental Involvement as a Protective Factor**

Mothers play a critical role in children's psychosocial and academic development and may serve as a protective factor for children's academic outcomes, reducing the academic problems children with mental health problems commonly experience. Children with parents that are more involved in their education may have fewer mental



health problems, even if they are living in food-insecure households. Previous studies have examined how parental involvement in education, ranging from help with homework to simply talking about school, helps children's academic achievement (Boonk, 2018; Jeynes, 2016; Samoray, 2019). Though food insecurity may be linked to mental problems such as ADHD depression, anxiety, and inattention, maternal involvement could be a contributing protective factor buffering the negative effects of mental health problems on children's academic achievement. During COVID-19 mothers were thrust into an educator role with the transition to online learning and such involvement may provide additional opportunities for their children to learn. On the other hand, children's learning was more dependent on parental involvement. Involved mothers can demonstrate to children that they care about their success and are willing to help their children succeed; thereby fostering a more positive outlook in children. On the other hand, if mothers are disengaged, their children may be less likely to feel the need to do well in school. Likewise, students may not grasp the material taught in class and may experience additional frustration from the lack of maternal support. Students with mothers that are not involved and are already experiencing mental health problems such as depression and anxiety, may have no sense of motivation to succeed in addition to the already existing negative connotation around education from their parents. There are multiple gaps throughout the literature, and very few studies that make it unclear which forms of involvement (i.e., Involvement in school, help with homework, motivation, etc.) serve their children best, as well as if maternal involvement can buffer the academic consequences of ADHD, depression, and anxiety. This study will contribute to closing

the gap and providing a better understanding of how maternal involvement protects against mental health issues, allowing students to perform better in school.

### **CHAPTER III: PRESENT STUDY**

The current study examined symptoms of depression, anxiety, and ADHD as mediators linking food insecurity to academic performance during the COVID-19 pandemic among second through fifth grade children. Further, we examine maternal involvement as a moderator of the association between children's mental health problems and student GPA. The reason for choosing only mothers as the central source of information is because they tend to be the primary caregivers in households and are more involved in what their children do. According to the Census data, approximately 80.4% of custodial parents are mothers while only 19.6% of custodial parents (approximately 1 in 5) are fathers (US Census, 2020). Mothers are also more prevalent in low-income households, and we tend to see biological fathers not present. According to the Statista Research Department (2021), approximately 3.33 million children living with single mothers who never married were living below the poverty line in the U.S. in 2019. Only asking for students between grades second and fifth is due to the idea that they are more accustomed to routine, have more critical thinking abilities, are fully capable of determining right from wrong, have most likely developed or been diagnosed with, if any, mental health issues, and more self-regulated, (CDC, 2021). They also begin to develop a greater sense of responsibility and awareness of their actions, think more logically, assert their independence, and look for more opportunities to become responsible (Thompson, 2021). Based upon numerous studies and thorough research, it is evident that students are impacted in multiple ways by food insecurity within the household. The first hypothesis is that students living in more food insecure households will experience lower GPA and the relationship will be mediated by depression, anxiety,

and ADHD. The second hypothesis is that the indirect (mediated) effects are conditional based on levels parental involvement where high levels of parental involvement would reduce the impact of mental health problems on student GPA.

## **CHAPTER IV: METHODS**

### **Recruitment and Data Collection**

Data for the current study was collected via an anonymous online survey administered through Amazon Mechanical Turk (MTurk). MTurk is a crowd sourcing website where “workers” complete tasks and then are paid (Shank, 2016). MTurk also provides the study with data from a diverse population. We created a secure online survey using Qualtrics and posted it to the MTurk website. Manipulation checks were included throughout the survey and participants that “clicked” through the survey were excluded from the analysis. The manipulation checks are used to ensure participants are not simply clicking random answers. For example, the check will say, “select ‘no’ as the answer.” If the participant were to check “yes,” we would know they were likely not truly participating in the survey and “clicking through”. Participation took an average of 11 minutes to complete approximately eighty questions. Once the participant completed the survey, 50 cents compensation was awarded.

### **Procedures**

The data collected originally included 1294 participants. Through close observation and studying individual demographics, we were able to narrow down the results. Participants that took the survey more than once were filtered out so that only one attempt would be included in the final collection. Participants that did not complete the entire survey were eliminated, as well as those who attempted to take the survey but were non-females. This led the sample size to 520 participants. From this point, 107

participants were eliminated that only took the demographics section of the survey, along with respondents that did not live in the United States (n = 8). Respondents that completed the survey in an unreasonably fast amount of time were taken out, as their results are likely to be inaccurate. Twenty-five respondents failed the manipulation checks, resulting in deletion of their participation. After all participants were closely filtered, 400 accurate responses were left for data collection and assessment.

### **Participants**

For this study, 400 participants included mothers of elementary students in grades 2nd through 5th who have experienced financial effects of COVID-19 such as furlough, job loss, increased work hours, food insecurity, etc. Measures Food Insecurity To measure food insecurity, this study adopted the CORE Food Security scale (Hamilton, 1997). The CORE Food Security scale consists of an 18-item scale ranging from 1) never true, 2) rarely true, 3) sometimes true, 4) often true, and 5) extremely true, that measures household food security in the last 12 months. An example item was “within the last twelve months I could not afford to feed my child a balanced meal.” The items were summed together, and higher scores reflect greater food insecurity

### **Child Mental Health**

The NICHQ Vanderbilt Assessment Scales are used to measure student mental health problems. The NICHQ Vanderbilt Assessment Scales have subscales of defiance, conduct, anxiety / depression, and ADHD. The current study utilized anxiety / depression, and ADHD subscales. The NICHQ has been one of the leading measures for

determining student mental health (National Institute for Children’s Health Quality). The survey is measured on a four-point scale included response of 1) never true, 2) occasionally, 3) often, or 4) very often to determine frequency of symptoms. An example item was, “my child seems fearful, anxious, or worried.” The items on each of the respective subscales were summed together for a composite score with higher scores reflecting more severe problems.

### **Parental Involvement**

In this study, parental involvement is measured by using the Parental Involvement: Model Revision Through Scale Development (Walker, 2005). There are multiple subscales of this survey measuring parental self-efficacy, parental perceptions, parental involvement, and parental role construction for involvement in education. For this study, only Appendix A: Parental Role Construction for Involvement in Education, and Appendix F: Time and Energy are used to measure parental involvement in their child’s education, and the time spent being involved with the child’s school. An example question from Appendix A is, “I believe it is my responsibility to help my child with homework.” Appendix F had questions such as, “I have enough time and energy to communicate effectively with my child about the school day.” The survey was measured using a 6-point scale ranging from, 1) disagree very strongly, 2) disagree, 3) disagree just a little, 4) agree just a little, 5) agree, 6) agree very strongly. These survey questions provide accurate measures for if, and how frequently the parent is involved in the student’s academic life. Items from this section were summed.

## **Student GPA**

The student GPA section consists of questions looking at overall GPA, along with individual subject grades ranking from A to F. Each letter grade was coded and corresponded with a variable, (A=4), (B=3), (C=2), (D=1), and (F=0). The respondents answered for the Fall semester of 2020. In Fall of 2020, some students were back in school, but the majority were online.

## **Covariates**

### **Assessing Student Medical History**

A series of questions addresses the student's past and current medical history. The questions consist of inquiring about anemia, learning disorders, ADHD, anxiety, depression, treatment for any of the above, and current medications. The importance of inquiring about these questions is to make sure that if students are showing symptoms of ADHD, depression, and anxiety we will be able to draw possible connections to food insecurity. Any medication that the student is on may cause the child to not show any of the above symptoms, or slightly suppress them. If the student has a history of exhibiting a learning disorder, food insecurity may not be the direct cause of poorer grades and/or participation. Results from students that answer "yes," or being on medication to control having one of the following: ADHD, depression, anxiety, learning disorder, will be closely looked at and taken into account. Learning disorders were dichotomously coded (1) and not having a learning disorder was coded as (0).



## **Demographics**

Demographic questions included age, gender, marital status, household status, number of children, ethnicity, level of education, location in the United States, annual household income, and employment status.

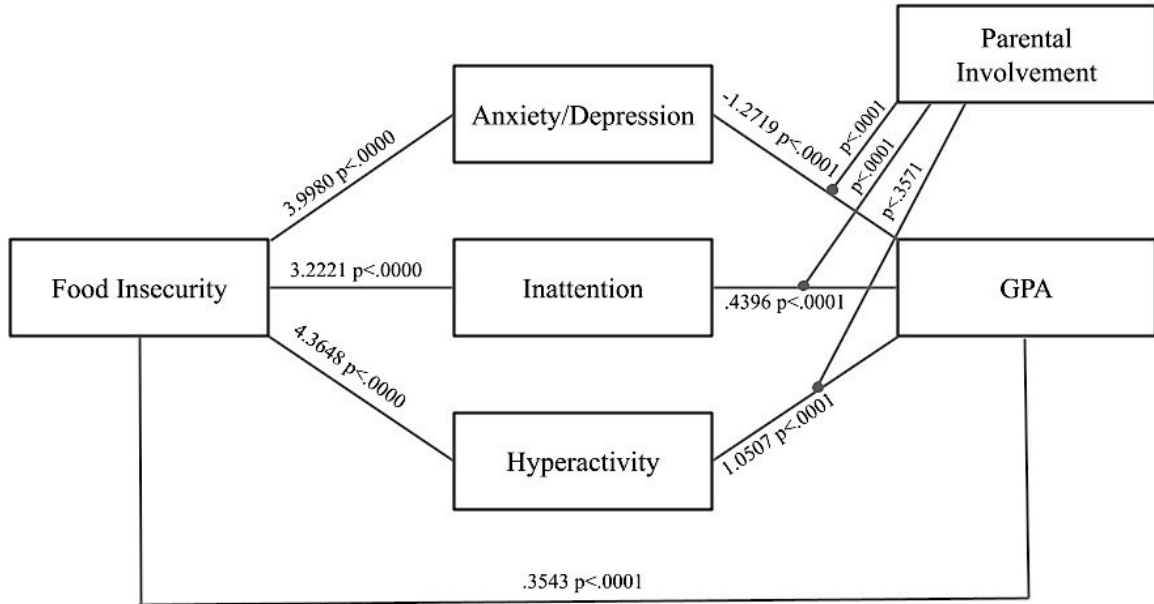
With the remaining data, the information gathered from the survey was coded to see clearer pathways. Participants with a white ethnicity were coded a (1) and all other minorities were coded (0). This is because the overall number of minorities was so large, but each individual ethnic group was a smaller number. The level of education was coded as (0) no education, (1) some education, (2) high school education, (3) bachelor's degree, (4) master's degree, (5) Ph.D., and (6) trade. Employment status was coded as (0) unemployed, and (1) employed. Employment included part-time (1) and unemployed job seekers (0). Marital status was coded (0) for single or dating and (1) for married. This information is important to consider for income purposes. It is also important to note that each family was receiving a stimulus check. Factors that were deemed unimportant such as the age of the mother and geographic location were taken out because there was no visible effect of these on household food insecurity.

## **CHAPTER V: STATISTICAL ANALYSIS**

A multistep approach was used to examine the associations among food insecurity, mental health problems, parental involvement, and GPA. The statistical analysis began by generating the correlations, means, and standard deviation among the study variables. Following the bivariate and descriptive analysis Hayes Macro (Hayes, 2017) was used to examine the moderated mediational model. The hypothesis was based on research into food insecurity affecting GPA, along with implications that mental health serves as a mediator and parental involvement could possibly be a moderated mediation to GPA. Students that live in food-insecure households are likely to have lower GPAs because of poor mental health; however, positive parental involvement could serve as a protective factor resulting in an unchanged or higher GPA. The hypothesis was tested by creating models that compared demographic factors, along with the results of the means from the specific survey questions with student GPA.

## CHAPTER VI: RESULTS

*Figure 1: Unstandardized Path Coefficients of the Moderated Mediation Model*



The bivariate correlations between food insecurity and student GPA are presented in Table 1. The unstandardized path coefficients of the moderated mediation model are presented in Figure 1. Food insecurity was negatively associated with Fall 2020 GPA ( $r = -.36, p = .89$ ). Food insecurity was positively associated with inattention ( $r = .70, p = .00$ ), hyperactivity ( $r = .73, p = .00$ ) and anxiety and depression ( $r = .78, p = .00$ ). Student mental health and GPA proved to have a significant relationship. Inattention ( $r = -.30, p = .48$ ) and hyperactivity ( $r = -.33, p = .04$ ), and Anxiety and depression ( $r = -.39, p = .04$ ) were negatively associated with GPA. Parental involvement had no significant correlation ( $r = -.10, p = .76$ ) with GPA. However, with mental health, significance was found between parental involvement and inattention ( $r = .32, p = .001$ ), as well as

anxiety/ depression ( $r = -.33, p = .001$ ) as shown in graphs 1 and 2. Higher levels of parental involvement resulted in lower levels of inattention, whereas with anxiety / depression, higher levels of parental involvement resulted in lower GPA.

**Table 1: Descriptive Statistics Among Independent, Mediating, Moderating, and Outcome Variables**

	1	2	3	4	5	
<b>1. Food insecurity</b>	-					3.31 (.863)
<b>2. Inattention</b>	.696**	-				18.58 (4.323)
<b>3. Hyperactivity</b>	.726**	.821**	-			23.66 (5.557)
<b>4. Anxiety / Depression</b>	.776**	.790**	.807**	-		18.38 (4.857)
<b>5. Parental Involvement</b>	.292**	.295**	.270**	.229**	-	3.55 (1.112)
<b>6. Fall 2020 GPA</b>	-.356**	-.259**	-.325**	-.387**	-0.095	27.79 (4.910)
Note. ^ Correlation is significant at the ** $p < .01$ level						

Figure 2: Parental Involvement and Inattention Interaction

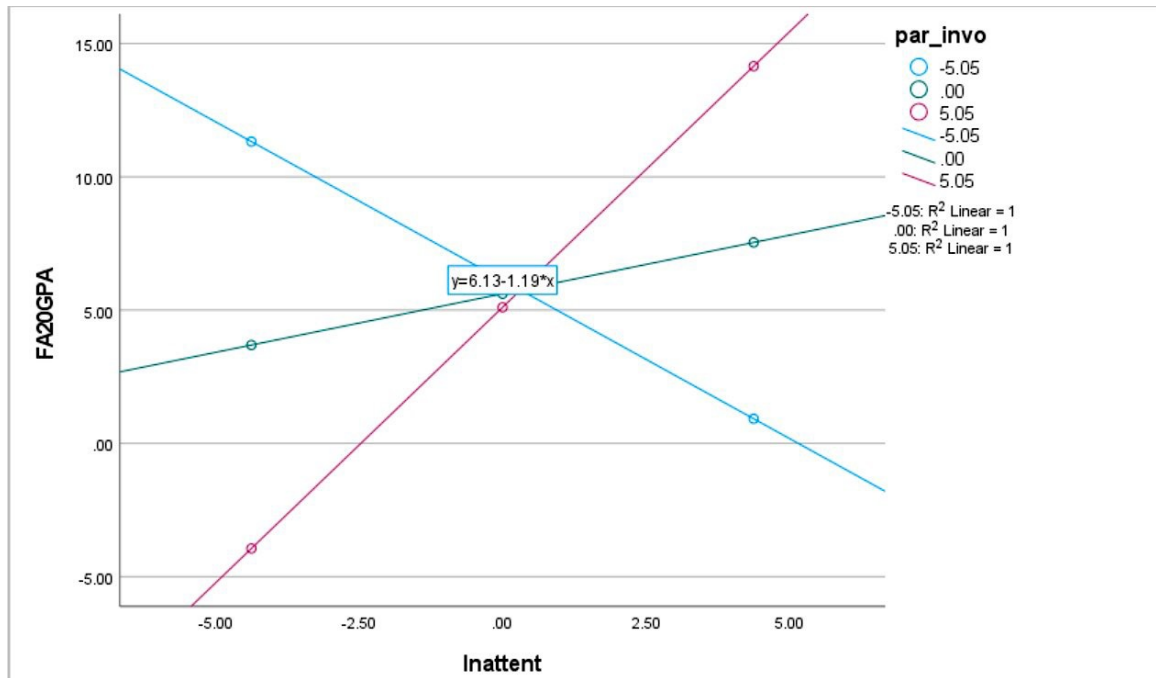
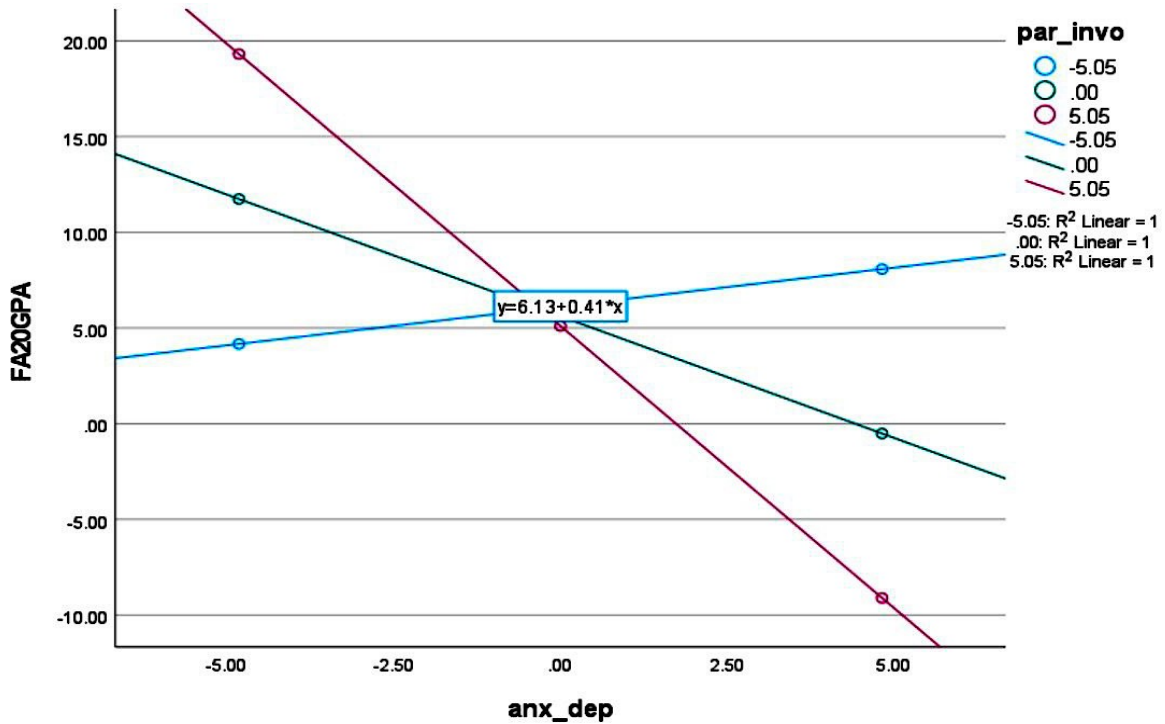


Figure 3: Parental Involvement and Anxiety/Depression Interaction



The effects of the mediation of mental health issues on food insecurity and GPA were observed and are presented in table 2. The results of the mediational model showed that food insecurity was not associated with Fall 2020 GPA ( $b = .35, p = .89$ ); however, food insecurity was associated with each of the mental health outcomes. Food insecurity was positively associated with inattention ( $b = 3.22, p < .000$ ) where the higher levels of food insecurity within a household, the higher levels of inattention students reported by mothers. It was found that food insecurity was positively associated with hyperactivity ( $b = 4.36, p < .001$ ). Food insecurity was also associated with greater anxiety and depression ( $b = 3.998, p < .001$ ). Regarding student mental health and GPA, there proved to be significant relationships. Inattention was associated with greater GPA ( $b = .439, p =$

.05). Students that have attention problems had a lower GPA. Hyperactivity was positively associated with GPA ( $b = 1.05, p = .04$ ). Anxiety / depression were also associated with GPA ( $b = -1.27, p = .04$ ). Regarding the relationship between parental involvement as a protective factor and possible mediator between student mental health and GPA, the relationship was found to be non-significant. The moderating effects of parental involvement linking mental health problems to GPA were non-significant. More specifically, parental involvement did not modify the association between inattention and GPA ( $b = -3.827, p = .25$ ). Likewise, the effects of parental involvement for hyperactivity ( $b = 4.48, p = .36$ ) and anxiety and depression and GPA ( $b = 1.622, p = .10$ ) did not modify the relationship with GPA. The overall test for parental involvement as a moderated mediator between inattention ( $b = 1.038, p = .85$ ) and GPA, hyperactivity ( $b = .021, p = .72$ ) and GPA, anxiety / depression ( $b = -1.329, p = 1.01$ ) and GPA was non-significant.

**Table 2: Unstandardized Direct Effects**

Predictor	Outcome	Significance (p)	b(SE)
Food Insecurity	GPA	0.89	0.36
Food Insecurity	Anxiety / Depression	0.001	3.998
Food Insecurity	Inattention	0.001	3.22
Food Insecurity	Hyperactivity	0.000	4.36
Anxiety / Depression	GPA	0.04	-1.27
Inattention	GPA	0.05	0.439
Hyperactivity	GPA	0.04	1.05
Parental Involvement	GPA	0.25	-3.827



## CHAPTER VII: DISCUSSION

This study sought to understand the relationship and effects of food insecurity during the COVID-19 pandemic on student GPA through symptoms of depression, anxiety, and ADHD. The study hypothesized that student mental health problems would mediate the association between food insecurity and GPA. It was also hypothesized that parental involvement might serve as a moderator between student mental health and GPA. It was found that food insecurity was indirectly associated with lower student GPA through mental health problems. More specifically, the results indicate that higher levels of food insecurity present a strong, positive relationship to inattention, hyperactivity, and symptoms of anxiety and depression. However, the data suggests that mental health is associated with student GPA differently. Higher levels of inattention and hyperactivity contribute to a lower GPA, while anxiety and depression have the opposite effect and resulted in a higher GPA. Parental involvement moderated the relationship between anxiety / depression and inattention but did not moderate the relationship between hyperactivity and GPA.

The results of this study conclude that food insecurity has a significant effect on students' mental health. Looking at the relationship between food insecurity and inattention, it was found that mothers who reported greater levels of food insecurity also reported that their children struggled to pay attention and were more hyperactive. Children who have a diet that does not meet caloric standards, or consumption of food that does not provide the proper nutrients increases the risk for ADHD symptoms (Lu et al., 2019). Symptoms of ADHD in children often are linked to poor dietary intake, on the

contrary, children that meet the dietary recommendations for their age show less symptoms of ADHD (Azadbakht et. al., 2012; Loewen et. Al., 2020). For example, Rongstad (2018) examined the relationship between food insecurity and symptoms of ADHD in young children and found that children living in food insecure households were significantly more diagnosed with ADHD than those who were not at risk for food insecurity.

Food insecurity was also found to have a significant effect on anxiety and depression. Numerous studies have previously shown that greater food insecurity was associated with higher levels of depression (Arenas et al., 2019; Thomas et al., 2019). Diets that are high in saturated fats and refined carbohydrates are directly associated with depressive symptoms (O'Neil, 2014). Amino acids found in nutrient dense diets contribute to the production of serotonin on the brain; therefore, a lack of sufficient nutrients can lead to depression (Markus, 2008). This study is also an advancement on food insecurity research due to the diversity of race, as well as new information about the effects of food insecurity on elementary aged children. Previous studies primarily focus on white students (Smith et al., 2018), as well as college students (Phillips et al., 2018; Maroto et al., 2015).

One of the primary contributions that this study makes is by documenting that there are academic performance implications among children living in households characterized by greater food insecurity. This association was partially explained by children's mental health problems. The hypothesis that food insecurity contributed to a lower GPA through mental health problems such as inattention, hyperactivity, anxiety/depression, but this hypothesis was only partially supported. It was found that

higher levels of inattention and hyperactivity contributed to a lower overall GPA. This is most likely due to the inability to sit still and concentrate with classes being online, difficulties with behavioral issues, cognitive functions, and overall academic impairment (Keilow et al., 2018; CDC, 2021). These attention problems may be exacerbated by the shift to online education due to COVID-19. Contrary to hyperactivity and inattention, anxiety and depression were associated with a higher overall GPA. One explanation for this unexpected finding is that anxiety and depression were measured together, so the unique contributions of anxiety and depression cannot be determined. Most research shows that higher levels of depression lead to a poorer GPA, while several studies have found that higher levels can actually improve GPA (Steinmayr, 2016). Depressed students may hold more negative beliefs about their academic self-efficacy, have little interest in school, or have less energy to put towards learning. Anxiety may actually increase GPA because of students worrying about grades and striving to do well, studying harder, or overapplying themselves to earn higher grades. Another possible explanation is that parents were completing student's schoolwork for them, and they may be more likely to do so if their child was anxious or depressed. During COVID-19, parents were tasked with becoming the primary educator which was an additional stressor for many parents on top of economic, health, and relational stress potentiated by COVID-19 (Said et al., 2020; Smith et al., 2022). Consequently, mothers may have helped their children in a way beyond what would be normally available because of their added role as an educator. The overall results contribute to a clearer understanding of the effects that food insecurity has on mental health and GPA on elementary students, whereas much of the existing literature looks more specifically at the effects on college students.

Parental involvement was found to moderate the relationship between student mental health and student GPA, as represented in Graphs 1 and 2. The relationship between inattention and GPA was found to be moderated by parental involvement such that when parental involvement was low (-1 SD) and at the mean, the relationship between inattention and ADHD did not fluctuate. When parental monitoring was high, even children with high levels of ADHD reported increases in GPA. This could be due to parents offering support, redirecting, and helping the child refocus. The association between symptoms of anxiety/depression and GPA were also found to be moderated by parental involvement. When parental involvement was low (-1 SD), the child's GPA increased. When parental involvement was at the mean level or high (+1 SD) it was found that the association between anxiety/depression and GPA actually decreased. In other words, higher levels of parental involvement may cause additional stress on the child, and the parent may put too much pressure on their student. While previous research shows parental involvement may contribute to a higher GPA by helping with homework through talking about school with their children, providing additional opportunities for learning, or by offering support and encouragement, the results of this study indicate that involvement did influence the relationship between child mental health and academic performance, but in different ways. These findings with anxiety and depression and GPA were in contrast to previous research (Bailey, 2017; Gonzalez-De Hass, 2005) which highlighted that parental involvement is key in student success. This could be attributed to several factors. One possible explanation is that parents may put too much pressure on the student to do well in school. During the COVID-19 pandemic, most schools resulted in online learning, so it is possible that parents could have become less patient and more

irritable with their child because they may have been confused about how to help their child or stressed about becoming their child's primary educator. It may be that parental distress could also lead to higher levels of depression and anxiety in the student. Lastly, as much as mothers would like to shelter their children from any harm, parenting can't overcome the biological issues associated with food insecurity.

## CHAPTER VIII: LIMITATIONS

The current study had numerous strengths including contributing to a clearer understanding of the effects that food insecurity has on mental health and GPA on elementary students, and documenting that there are academic performance implications among children living in households characterized by greater food insecurity. However, this study is not without limitations. One major limitation was within the measurement. Anxiety and depression were measured together so it remains unclear why there were associations with greater GPA. Symptoms for anxiety and depression are not always similar and may not produce the same effect on GPA. Further research would be needed to determine individual effects of parental involvement as a moderator between depression and anxiety and GPA. A second limitation is that GPA was measured based on parents reports rather than school records. The use of school records would provide a more precise GPA as parents may only have used estimates. A third limitation is that this study was cross sectional in nature and data was collected from many individuals in a short period of time. Correlations were found between food insecurity, mental health, and GPA; however, these correlations could be further investigated in a longitudinal study.

The final limitation for this study is that only one informant was used for assessment of student mental health. Assessing child perspectives on mental health or parental involvement would enhance the results.

## CHAPTER IX: CONCLUSION

In this study, a multistep approach was used to examine possible associations among food insecurity, mental health problems, parental involvement, and GPA. This study indicates that there is a co-occurring relationship between students that live in food-insecure households and lower GPAs, through poor mental health; however, contrary to the hypothesis, parental involvement had no affect and did not serve as a protective factor resulting in an unchanged or higher GPA. Parents that reported higher levels of food insecurity also reported that their child presented symptoms of ADHD, depression and/or anxiety. In turn, students that presented mental health issues also were found to have a lower GPA. While further research is needed to establish clear effects of parental involvement on student mental health, our results are consistent with previous studies and conclude that food insecurity directly affects student mental health, as well as GPA.

# APPENDIX A: IRB APPROVAL LETTER

## Office of Research Integrity



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### NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER: IRB-21-127

PROJECT TITLE: The Impact of Food Insecurity on Academic Outcomes

SCHOOL/PROGRAM: Child and Family Studies, Curriculum and Instruction

RESEARCHER(S): Kristen Cole, Michael Fitzgerald

IRB COMMITTEE ACTION: Approved

CATEGORY: Expedited

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.

PERIOD OF APPROVAL: July 2, 2021

**Donald Sacco, Ph.D.**  
**Institutional Review Board Chairperson**



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