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History of Physical Neglect and Current Food Insecurity: Moderation by Mental Health Symptoms

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HISTORY OF PHYSICAL NEGLECT AND CURRENT FOOD INSECURITY:

MODERATION BY MENTAL HEALTH SYMPTOMS

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Abstract

Food insecurity has been a topic of concern for many years. While many actions have been taken to try to reduce rates of food insecurity, further research should investigate whether certain events may increase likelihood of this experience. Thus far, a large amount of research has been completed on how adverse childhood experiences (ACEs) can impact chances of experiencing food insecurity as well as how mental health symptoms can impact these chances. However, there is little research showing that mental health symptoms may moderate the relationship between having ACEs and food insecurity as an adult. A sample of 124 university students were given a measure of childhood maltreatment, a specific ACE, as well as self-report surveys of mental health symptoms and food insecurity. All types of childhood maltreatment were correlated with elevated challenges with mental health. Food insecurity was predicted by current mental health symptoms and childhood maltreatment, with history of physical neglect showing the strongest correlation. Moderation analysis demonstrated that the pathway between a history of physical neglect and current food insecurity was moderated by current anxiety symptoms. That is, food insecurity was only elevated for participants who had a history of physical neglect and current anxiety. These findings suggest that more specific policies should be put into place to help individuals who have ACEs and experience mental health symptoms to decrease their chances of experiencing food insecurity.

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History of Physical Neglect and Current Food Insecurity: Moderation by Mental Health Symptoms

Food insecurity is unfortunately something that many households face, with 12.5% of households in the United States facing this problem in 2021 (United States Department of Agriculture, 2022). Since this is such a prevalent problem in the United States, it is important to find the causes, and create solutions to the problem so that as few people as possible have to go through this experience. There have been many topics studied that can be related to food insecurity, with two specific topics being Adverse Childhood Experiences (ACEs) and having symptoms of mental health disorders. Those who have ACEs have been shown to have an increased likelihood of food insecurity, with some studies even showing a 13-21% increase with each additional ACE (Roy et al., 2019). With this large percentage, it is clear that ACEs should be further investigated to determine how exactly they impact people's chances of experiencing food insecurity.

Importantly, ACEs also can have an impact on experiencing mental health symptoms as an adult. More specifically, studies have shown an increased likelihood for individuals who had ACEs to experience depression, suicide attempts (Dube et al., 2001), and anxiety in comparison to those who did not have ACEs (Hedrick, 2021). Furthermore, there has been evidence of biological processes in individuals' brains that can impact their mental health when they have ACEs (Chapman et al., 2007). There is also evidence that experiencing mental health symptoms is related to experiencing food insecurity. In one study looking at emergency room visits due to a psychiatric emergency it was found that of participants with severe mental illness, 71% had food insecurity and 44% had severe food insecurity (Mangurian et al., 2013). These percentages are much

higher than the general population, giving reasons for concern. Most important to note is how all three of these elements all fall together. When individuals experience both ACEs and mental health symptoms, there are increases in changes of experiencing food insecurity. Research has demonstrated that those who had four or more ACEs as well as symptoms of depression experienced low food security 12.3 times as often and very low food security 28.8 times as often as the general population (Sun et al., 2015;2016). Clearly, the relationship between these three elements has been established. This study examined specific ACEs involving childhood maltreatment, and how these relate to food insecurity. It was also of interest to investigate whether mental health symptoms moderated the pathway between ACEs and food insecurity. The purpose of this study was to find if such moderations exist. The study investigated whether current mental health symptoms impacted whether childhood maltreatment history predicted current food insecurity.

Review of Related Literature

Through the literature, there seems to be a connection that can be made between having ACEs, experiencing food insecurity as an adult, and having mental health symptoms as an adult. ACEs can be described as "potentially traumatic events that can have negative lasting effects on health and well-being" according to Boullier and Blair (2018, p. 132). This essentially means that there are certain experiences that individuals can face in their childhood that goes on to have an effect on their adult lives. Boullier and Blair also state that these ACEs occur in the first 18 years of an individual's life and experiences can include emotional, physical, or sexual abuse, household challenges such as the mother being treated violently, substance abuse in the household, mental illness in

the household, parental separation or divorce, or a member of the household being involved in criminal activity. Often, when individuals have ACEs in their childhood, they can go on to later experience food insecurity in their adult lives. As the number of ACEs that an individual increases, their likelihood to experience adult food insecurity also increases. Having ACEs also leads to an increased likelihood of experiencing mental health symptoms having to do with depression, anxiety, and suicidality, and mental health symptoms are predictive of food insecurity. It may be the case that experiencing mental health symptoms is a factor causing individuals to experience food insecurity, or that experiencing food insecurity is a factor in causing individuals to experience mental health symptoms. The causal pathway is difficult to determine. Lastly, it can be shown that having a combination of ACEs and mental health symptoms can increase likelihood to experience food insecurity. Since all these items relate to each other in some way, it is important to look further into each element to make more concrete connections.

Adverse Childhood Experiences

ACEs are important to look at to see if they cause any later effects in an individual's life. Based on previous information given about ACEs, it is clear that individuals can experience a wide range of events that may have an effect on their adult lives, which emphasizes the importance of ensuring that children have positive childhood experiences. Karatekin (2018, p. 37) cited a study that found how much of the population have ACEs and found that over one third of adults report experiencing two or more ACEs in the general population, but that "a study conducted in the United States in the 1990s that used a limited list of ACEs found that 56 to 85% of college students had been exposed to at least one severe ACE" (Anda et al., 2006; Smyth et al., 2008). If one third

of the general population have ACEs but 56 to 85% of the college student population have ACEs, then the college population may be an important one to look at because of their increased likelihood to have these childhood experiences.

Childhood Maltreatment

One specific type of ACE is child maltreatment. Child maltreatment can be defined as events before an individual turns eighteen where the person in charge of care for them acts or fails to act in a way that results in either harm or possible harm to the individual, even if the caregiver's intent was not to harm them, according to Leeb (2008). Gilbert et al. (2009), also described four types of child maltreatment, including physical abuse, sexual abuse, psychological abuse, and neglect. When looking at the individuals responsible for this maltreatment, it has been found to be perpetrated by the child's parents 80% or more of the time (UNICEF Innocenti Research Centre, 2003, as cited by Gilbert et al., 2009). Child maltreatment also is somewhat common, with one in ten children experiencing neglect each year (Gilbert et al., 2019). Looking at college students specifically, it has been estimated that between 34 to 50% of students experienced some degree of child abuse or neglect (Clemmons et al., 2007, as cited by Maples et al., 2014). According to one study, this was comparable to the prevalence of the general population that experienced such maltreatment (Scher et al., 2004). Another unfortunate aspect of child maltreatment is that those who experience one type of maltreatment are at a higher risk to experience multiple other types of maltreatment and have repeated exposure over time, increasing the severity of maltreatment (Edwards et al., 2003; Dong et al., 2004; Finkelhor et al., 2007; Clemmons et al., 2007, as cited by Gilbert et al., 2009).

It is important to consider how children may be affected by their maltreatment, including possible effects in adulthood. Research has shown that experiencing maltreatment as a child can lead to an individual having problems with mental health issues, "drug and alcohol misuse… risky sexual behaviour, obesity, and criminal behavior" with these problems lasting through adulthood (Gilbert et al., 2009, p. 68). With so many possible negative outcomes, scientific investigations of child maltreatment should be prioritized. To measure childhood maltreatment, specific measures can be used. The Childhood Trauma Questionnaire (CTQ) is a questionnaire that measures emotional abuse, sexual abuse, physical abuse, emotional neglect, and physical neglect, and is the most common measure (Bernstein and Fink, 1998 as cited by Macdonald et al., 2016). This questionnaire, used in the current study, can identify individuals who have experienced maltreatment so they can be referred to professional help.

This study will specifically consider neglect, which was defined by Gilbert et al., as "failure to meet a child's basic physical, emotional, medical/dental, or educational needs" as well as a "failure to provide adequate nutrition, hygiene, or shelter" and "failure to ensure a child's safety" (Leeb, 2008, as cited by Gilbert et al., 2009, p. 69). While this definition encompasses a lot of possible situations, they each are important aspects that should be considered when looking at one's upbringing. Some of the most common types of maltreatment involve neglect, with supervision neglect being reported by 41.5% of respondents in one study, and physical neglect being reported by 11.8% of respondents (Hussey et al., 2006). Hussey et al. (2008), described supervision neglect as a child being left alone at home. It is important to know this so that people can look out for children that may be experiencing these problems and begin to give them the help and

resources that they need. Furthermore, it is important to relate these types of neglect to experiencing food insecurity as a child. When an individual is experiencing supervision neglect, there is not an adult at home to ensure they are receiving the nutrition that they should be. Physical neglect is similar in that there is not an adult that is helping the child meet their physical needs, which includes nutritious food for the child to eat.

Food Insecurity

Food insecurity can be defined as "the limited or uncertain access to nutritionally adequate, safe, and acceptable foods that can be obtained in socially acceptable ways" (United States Department of Agriculture Economic Research Service, 2019, as cited in El Zein et al., 2019, p. 2). Included in experiencing food insecurity is when individuals run out of food and cannot afford more, when individuals experience anxiety over affording meals, or having a poor-quality diet because the individual has limited financial stability (United States Department of Agriculture Economic Research Service, 2019, as cited in El Zein et al., 2019). This definition is quite broad and includes many different situations that people may experience, so it is important to note how prevalent this condition is. According to the United States Department of Agriculture, in 2021 10.2% of households were food insecure during the year with 6.4% of this total having low food security and 3.7% having very low food security (United States Department of Agriculture, 2022). When a household is experiencing very low food security, food intake of at least one member of the household is reduced and eating patterns are disrupted because of the lack of resources such as money to purchase food (United States Department of Agriculture, 2010). These percentages demonstrate that quite a high number of U.S. households are experiencing food insecurity.

Studies have also considered how many college students specifically are experiencing food insecurity. A study competed by El Zein et al., (2019), found that 19% of their participants, which included first-year university students in the United States, were food insecure, 7.1% experienced severe food insecurity, and an additional 25.3% were at risk of experiencing food insecurity. Another study cited by Bruening et al., (2017), found that those students in postsecondary education are at nearly a two-fold higher rate of experiencing food insecurity compared to the general population (United States Department of Agriculture Economic Research Service, 2016). Again, these high percentages and likelihoods for students to experience food insecurity are reasons for concern in the United States. One study also looked at which college students were most likely to experience food insecurity, and they found that those "who identified as a racial minority, lived off-campus, received a Pell grant, reported a parental education of high school or less, and did not participate in a meal plan" were at an increased risk to experience food insecurity (El Zein et al., 2019, p. 1). It is important to pay attention to which students are most likely to experience these struggles so that there can be an increased amount of help that they receive. It is also important to look at other topics that may lead to people experiencing food insecurity.

Childhood Maltreatment Related to Food Insecurity

After establishing what exactly ACEs and food insecurity are and their prevalence in the United States, it is important to consider how the two may relate to each other. There are many studies showing correlations between having ACEs and later experiencing food insecurity as an adult. Hege et al., (2020), found that in Appalachia residents who had four or more ACEs were more likely to report being food insecure.

This shows that those who had four or more ACEs are at an even higher risk of experiencing food insecurity and that there may be some relation there. To further demonstrate that there may be a relationship between having ACEs and experiencing food insecurity as an adult, Roy et al., (2019), found that with each additional ACE, a person's likelihood to experience food insecurity as an adult increased by 13-21%.

Some research has found that specific categories of ACEs may have a greater impact than others. Specifically, both physical and emotional abuse led to an increase in likelihood to experience food insecurity of 56-90% (Roy et al., 2019). These elements show that not only do ACEs increase the likelihood of experiencing food insecurity, but also that specific ACEs can have a greater impact than others. So, while an individual who experiences substance use in the household is at an increased risk of experiencing food insecurity as an adult, an individual who experiences physical or emotional abuse may be at an even higher risk of this. In addition, increasing the number of ACEs someone has will also increase their likelihood of experiencing food insecurity more and more per ACE. Another study found that mothers who experienced emotional and physical abuse were more likely to experience low food security (Chilton et al., 2015). These studies are consistent in demonstrating that those experiencing physical or emotional abuse are at an increased risk of experiencing food insecurity as an adult. To add to this, of the caregivers that participated in their survey, 68% reported having four or more ACEs, and these experiences were associated with having very low food security (Chilton 2015). One last study by Testa and Jackson (2020) found that having four or more ACEs increases likelihood of experiencing food insecurity substantially, but even those who have fewer ACEs still have risk to experience food insecurity in adulthood

when compared to those who do not have any ACEs. Overall, these studies suggest that having a greater number of ACEs, and physical and emotional abuse in particular, is related to later experiencing food insecurity when an individual becomes an adult.

Research that has examined childhood maltreatment specifically shows some interesting data that is important to consider. According to Cohen et al. (2018), those who have history of neglect are more likely to experience food insecurity than "other pediatric populations." In addition, they also found that the likelihood of experiencing food insecurity persists into adulthood. Unfortunately, there is not currently a lot of research showing the relationship between child maltreatment, and physical neglect in particular, and adult food insecurity, but it is a relationship that should be explored further since food insecurity has been seen to be a serious problem in the United States. This was a main objective of the current study.

Childhood Maltreatment Related to Current Mental Health Symptoms

Studies have also shown a relationship between having ACEs and later experiencing mental health symptoms as adults. For example, it has been found that women who experienced abuse in their childhoods were significantly more likely to experience depression and anxiety and those who experienced severe depression were two times as likely to have gone through emotional abuse in their childhood when compared to those who had mild or moderate depression (Chapman et al., 2007). This increased likelihood to experience depressive symptoms when an individual has had ACEs, and the likelihood to have more severe depression, is an area for concern. A second study found that those who experience childhood trauma or adverse experiences are at an increased likelihood to have health outcomes such as problems with substance

abuse and mental health issues such as depressive disorders or suicide attempts (Dube et al., 2001). More specifically, Dube et al., found that "each of the 8 adverse childhood experiences increased the risk of ever attempting suicide from 2- to 5- fold" and that "approximately two thirds (67%) of suicide attempts are attributable to the types of abusive or traumatic childhood experiences… studied" (2001, p. 3094-3095). So, while depression was mentioned on this list again, it is important to note that there are more consequences than depression or depressive symptoms alone. A third study found that nursing students who had four or more ACEs scored higher on mental health items such as depression and anxiety on the DASS-21 at a statistically significant level (Hedrick et al., 2021). This study has more updated research to show that those who have a higher number of ACEs experience mental health symptoms of anxiety and stress, in addition to depression. Lastly, Hege et al., found that those who had four or more ACEs were more likely to report symptoms of poor mental health (2020), without explicitly naming the conditions. While all these studies together find that there is a relationship between ACEs and mental health symptoms as an adult, it is important to know the reason that this may be occurring. Chapman et al. (2007, p. 360), found that "autonomic nervous system and hypothalamic-pituitary-adrenal axis hyper-activity may be a consequence of childhood abuse, heightening the subsequent risk for depression." This shows that there are brain processes that are affected when people have ACEs, and there is likely more happening than just what meets the eye.

Maltreatment also appears to be relevant to the onset and severity of mental illness. Struck et al. (2020), found that onset occurs at a younger age for depression when someone experiences child maltreatment, where emotional abuse and physical neglect

specifically were predictors of said sooner onset. However, it is not only depression that has an increased likelihood when an individual had experienced maltreatment. Scott et al. (2012), found that mental disorders such as mood disorders, anxiety, and drug use all have an increased likelihood for those in young adulthood if they have experienced maltreatment. To add to this, Macdonald et al. (2016), found that there was an increased likelihood for an individual to be a psychiatric patient if they experienced abuse or neglect in their childhood. Each of these studies together shows that maltreatment specifically can lead to individuals experiencing problems with their mental health.

Current Mental Health Symptoms and Food Insecurity

A third connection that can be made is between current mental health symptoms and the likelihood of experiencing food insecurity. For example, it was found that individuals with symptoms of depression "were 5.3 times as likely to report LFS [low food security]" when compared to those who did not have symptoms of depression (Sun et al., 2015;2016, p. 563). This is a concerning multiplier when it comes to individuals who experience food insecurity. Moreover, the chance that an individual had a visit to the emergency room due to a psychiatric emergency was also five times higher when they were severely food insecure. (Mangurian et al., 2013). Again, the fact that those who were severely food insecure were at such an increased risk visiting the emergency room because of a psychiatric emergency is concerning, and something that should be looked at very closely. This study completed by Mangurian et al. (2013, p. 932), also found "a 71% prevalence of food insecurity and a 44% prevalence of severe food insecurity in [their] sample of patients with severe mental illness," with these rates being significant compared to comparisons to populations that did not have mental illness. This significant

rate supports a relationship between experiencing mental health symptoms and food insecurity.

It is also important to note that there are many ways that symptoms of mental illness and food insecurity may be related. The neomaterial view is the idea that food insufficiency can worsen mental health symptoms due to nutritional shortfalls as well as reduction in beneficial health behaviors (Bhattacharya et al., 2004; Lynch et al., 2000, as cited by Heflin and Ziliak, 2008). While this outlook does exist, it is important to note that there are many other possible pathways between mental health and food insecurity. For example, mental health is likely to have a negative impact on individual's behaviors that can result in increased food insecurity. However, while there are different outlooks on the pathway, it is clear that the two adversities are linked.

Adverse Childhood Experiences, Mental Health Symptoms, and Food Insecurity

One last connection that can be made is between all three categories, including ACEs, mental health symptoms, and food insecurity. Of the studies previously discussed, three of them were able to make this connection. First, Hege et al. (2020), found that when individuals reported four or more ACEs, they were more likely to also report both frequent mental distress and food insecurity. While mental distress was not clearly defined by the authors, it may be the case that distress can include certain mental health symptoms. To add to this point, Testa and Jackson (2020) found that linking ACEs and food insecurity together can be at least partially explained by experiencing symptoms of depression. This not only shows that there was a relationship between the three elements, but also that there may be more concrete ideas of what elements can explain others. And lastly, it was found that caregivers that had depressive symptoms as well as four or more

ACEs “were 12.3 times as likely to report low food security… 28.8 times as likely to report very low food security… and 17.6 times as likely to report child food insecurity” when they were compared to individuals who did not have any symptoms of depression or ACEs (Sun et al., 2015;2016, p. 561). This shows that those with symptoms of depression were at an increased likelihood to experience low food security, and at an even higher increased likelihood to experience very low food security. All these studies together show that ACEs, food insecurity, and mental health may all have a relationship to each other.

Conclusion

Overall, the literature seems to point towards there being a relationship between ACEs, symptoms of mental health, and food insecurity. There are many people who are affected by each of these problems, and it is important to try to find a way to help the populations that go through this. Research has shown relationships between ACEs and food insecurity, ACEs and mental health, mental health and food insecurity, and most importantly a combination of ACEs, mental health, and food insecurity. Those who have ACEs have an increased likelihood to experience food insecurity, having ACEs increases likelihood to experience mental health symptoms as an adult, those who experience mental health symptoms are also more likely to be food insecure. Finally, having both mental health symptoms and ACEs lead to an increased likelihood that one will experience food insecurity. While the research seems to make these conclusions, it has not explored the moderations that may exist between the three elements discussed. More specifically, mental health has not been shown to moderate the relationship between having ACEs and being food insecure as an adult. In addition, more research is needed to

look at the specific adversity of child physical neglect and its association with food insecurity.

There were multiple research questions that will be addressed in the current study. Firstly, does childhood maltreatment in general, and physical neglect specifically predict adulthood food insecurity? Secondly, does maltreatment predict current mental health symptoms of depression and anxiety? Thirdly, do mental health symptoms of depression and anxiety predict food insecurity? And lastly, do levels of mental health symptoms of depression and anxiety moderate the effect of history of physical neglect on adult food insecurity? Currently, it is clearly shown there is a relationship between these elements. It is not clearly shown whether these moderations exist.

Methodology

Participants

Participants included 124 University of Northern Colorado students. These students had an age range of 18 to 30. There were 33 (26.6%) male participants, 85 (68.5%) female participants, and 6 (4.8%) who chose other. Unfortunately, there were technical difficulties in the collection of the ethnicity data, but it is likely that our sample mirrors the ethnic distribution at the University of Northern Colorado. These percentages are 62% White, 24% Lantinx/Hispanic, 5% multiracial, 5% African American, 2% Asian, <1% Native American, <1% Hawaiian, <1% Temporary United States Resident, and <1% Not Reported or Unknown. Participants were all in the Psychology 120 student pool and were recruited through the program SONA. The study was voluntary, and students received credit for their Psychology 120 class for their participation.

Data Collection Procedures

Data were collected and analyzed through the Qualtrics platform and Psychology 120 students signed up for the survey through SONA. The questionnaire had answers in a number format, so all data was quantitative. The survey was completed in an online format, and students' identity remained anonymous throughout data collection and analysis. To start the survey, participants were required to give informed consent.

Materials

The Childhood Trauma Questionnaire (CTQ) was used in order to measure childhood maltreatment among participants. This questionnaire has 28 items to be answered using never true, rarely true, sometimes true, often true, or very often true. Questions have to do with childhood trauma that the participant may have experienced during childhood (birth through 18 years). The specific types of trauma included on the questionnaire include emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), physical neglect (PN), and a CTQ total. Based on the responses to the three validity check items, participants who reported a "perfect childhood" were eliminated from the data analysis.

The Adult Food Security Survey Module (FSSM) was used to measure food insecurity that participants were facing at the time they completed the survey. This was created by the United States Department of Agriculture. It includes 6 items which were answered in either never true, sometimes true, always true format, yes or no format, or not applicable, only 1 or 2 months, some months but not every month, or almost every month. Questions asked about experiences with food and if participants had enough food to eat.

Lastly, the Symptom Checklist 90 (SCL-90) was used to measure mental health symptoms at the time that the participants filled out the survey. This checklist has 90 items which are answered on a scale of not at all, a little bit, moderately, quite a bit, or extremely. The mental health symptoms that were measured included somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, and paranoid ideation.

Data Analysis Procedures

Data was analyzed using the statistical techniques of correlation and moderation analysis. These measures looked for a significant correlation between those who experienced physical neglect, experienced current mental health symptoms, and experienced food insecurity. Following the identification of significant associations between maltreatment and food insecurity, moderation of these pathways by mental health symptoms was tested. This was correlational data, as causation cannot be established through this study.

Results

Associations Between Childhood Maltreatment and Food Insecurity

We conducted bivariate correlational analysis examining the associations between the total CTQ score, as well as scores on five types of maltreatment, and food insecurity scores. Higher scores indicate greater severity of childhood maltreatment and higher rates of food insecurity. As seen in Table 1, the correlations indicate that a history of emotional abuse, physical abuse, and physical neglect correlates with the food insecurity total. The strongest relationship is between physical neglect and the food insecurity total.

Table 1. Correlations between CTQ scores of Maltreatment and FSSM scores of food insecurity

	Food Insecurity Total
Emotional Abuse	0.228**
Physical Abuse	0.231**
Sexual Abuse	-0.027
Emotional Neglect	0.140
Physical Neglect	0.459**
CTQ Total	0.271**

***Correlation is significant at the 0.01 level (1-tailed).*

Note: CTQ Total = Childhood Trauma Questionnaire Total

Associations Between Childhood Maltreatment and Mental Health Symptoms

Correlational analyses were conducted to identify associations between the history of five types of childhood maltreatment, as well as experience of eight types of mental health symptoms. These symptoms include somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, and paranoid ideation. Table 2 indicates that there are significant correlations at the 0.01 level between emotional abuse with all types of mental health symptoms measured; physical abuse with obsessive-compulsive, depression, anxiety, and paranoid ideation; emotional neglect with obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, and paranoid ideation; physical neglect with all mental health symptoms besides hostility; and the CTQ total with all mental health symptoms. The table also indicates that there are significant correlations at the 0.05 level between physical abuse and

somatization and hostility, sexual assault with somatization, obsessive-compulsive, interpersonal sensitivity, depression, and phobic anxiety, and emotional neglect with somatization. Emotional abuse with mental health symptoms were the strongest relationships.

Table 2. Correlations between CTQ scores of maltreatment and SCL-90 scores of mental health

	Som	OC	IS	Dep	Anx	Host	P Anx	PI
EA	0.46**	0.58**	0.54**	0.59**	0.52**	0.38**	0.54**	0.57**
PA	0.17*	0.22**	0.15	0.27**	0.23**	0.21*	0.15	0.25**
SA	0.17*	0.20*	0.20*	0.18*	0.13	0.13	0.20*	0.08
EN	0.21*	0.33**	0.35**	0.32**	0.22**	0.25**	0.29**	0.36**
PN	0.23**	0.25**	0.22**	0.25**	0.27**	0.12	0.27**	0.28**
CTQ Total	0.38**	0.49**	0.46**	0.49**	0.42**	0.34**	0.45**	0.48**

***. Correlation is significant at the 0.01 level (1-tailed).*

**. Correlation is significant at the 0.05 level (1-tailed).*

Note: CTQ Total = Childhood Trauma Questionnaire Total; EA = Emotional Abuse, PA = Physical Abuse, SA = Sexual Abuse, EN = Emotional Neglect, PN = Physical Neglect. Som = Somatization. OC = Obsessive-Compulsive, IS = Interpersonal Sensitivity. Dep = Depression. Anx = Anxiety. Host = Hostility. P Anx = Phobic Anxiety. PI = Paranoid Ideation.

Associations Between Mental Health Symptoms and Food Insecurity

Correlational analysis was conducted to explore the associations between experiencing mental health symptoms and food insecurity. As seen in Table 3, There are significant correlations at the 0.01 level between anxiety and phobic anxiety with food insecurity. There are also significant correlations at the 0.05 level between somatization and depression with food insecurity. The strongest relationships were anxiety and phobic anxiety with food insecurity scores.

Table 3. Correlations between SCL-90 scores of mental health and FSSM scores of food insecurity

	Food Insecurity Total
Somatization	0.185*
Obsessive-Compulsive	0.109
Interpersonal Sensitivity	0.065
Depression	0.171*
Anxiety	0.270**
Hostility	0.038
Phobic Anxiety	0.236**
Paranoid Ideation	0.096

***. Correlation is significant at the 0.01 level (1-tailed).*

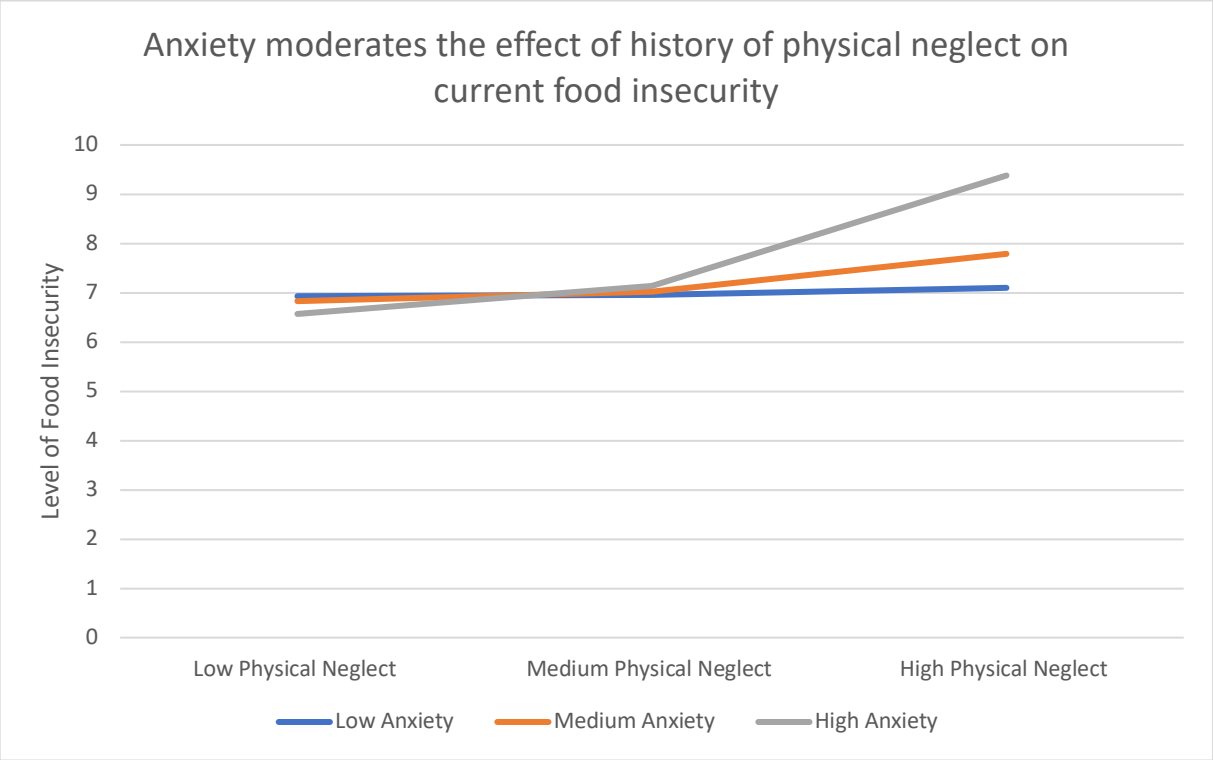
**. Correlation is significant at the 0.05 level (1-tailed).*

Pathway Between Childhood Maltreatment and Food Insecurity: Moderation by Mental Health Symptoms

The final research question asked whether any mental health symptoms changed or *moderated* the pathway between childhood maltreatment and food insecurity. That is, was the pathway between physical neglect and food insecurity different for different levels of current mental health symptoms? In this analysis, we examined whether anxiety moderated the effect of physical neglect history on current food insecurity using Hayes PROCESS statistical software. Results are reported using the t-test for the interaction term (the predictor X moderator), significance level, and the lower- and upper-limit confidence intervals (LLCI, ULCI) for this effect. In addition, in the case of significant moderation, the analysis reports the conditional effects which are the levels of the moderator (anxiety) at which the predictor (physical neglect) is significantly related to the outcome (food insecurity).

When the moderator, SCL-90 anxiety score, was entered into the model of physical neglect predicting food insecurity, the interaction between anxiety and physical neglect was significant, $t = 3.69$, $p = 0.003$, LLCI = 0.06, UCLI = 0.21. The conditional effects analysis demonstrated that physical neglect significantly predicted food insecurity at moderate and high levels of anxiety, but the strongest effect is seen at the highest level of anxiety, $t = 6.45$, $p = 0.00001$, UCLI = 0.74, LLCI = 0.39. Figure 1 shows that such moderation does exist. As physical neglect increases, moderate anxiety levels are related to some increase in food insecurity, and high anxiety levels are related to a very large increases in food insecurity.

Figure 1. SCL-90 anxiety moderation of the pathway between CTQ physical neglect and FSSM food insecurity



Discussion

Many connections can be made between the variables of childhood maltreatment, food insecurity, and mental health symptoms. The first research question asked whether physical neglect predicted adult food insecurity. This study specifically has shown a connection between childhood maltreatment and food insecurity, with a history of physical neglect being the strongest predictor of experiencing food insecurity as an adult. The second research question asked if childhood maltreatment predicted current mental health symptoms of depression and anxiety. There was a connection found between experiencing childhood maltreatment and having mental health symptoms as an adult.

Specifically, this study found that there was a strong relationship between experiencing emotional abuse and having a variety of mental health symptoms as an adult. The third research question explored whether mental health symptoms of depression and anxiety predicted food insecurity. A connection between experiencing mental health symptoms and food insecurity as an adult was identified. The strongest relationships were between both anxiety and phobic anxiety and higher food insecurity scores. The last research question asked if levels of mental health symptoms of depression and anxiety moderated the effect of history of physical neglect on food insecurity. The analysis demonstrated that anxiety moderated the pathway between childhood physical neglect and experiencing food insecurity as an adult. Those who had high levels of physical neglect history and moderate to high levels of current anxiety were most likely to report food insecurity. Importantly, levels of food insecurity had more drastic increases when anxiety levels were higher.

The literature review showed consistent findings with this study. It was first shown throughout the literature that there are connections between childhood maltreatment and food insecurity, with more experiences with ACEs leading to higher likelihoods that someone would experience food insecurity (Hege et al., 2020). The second connection shown was between childhood maltreatment and current mental health symptoms, where it was shown that individuals have a higher likelihood to experience mental health symptoms of anxiety and depression when they have a higher number of ACEs (Hedrick et al., 2021). Current mental health symptoms and food insecurity were also connected, with a high prevalence of food insecurity among those who had severe mental illness (Mangurian et al., 2013). Lastly, there was a connection made between all

three variables. It was shown that those who had four or more ACEs and experienced symptoms of depression were much more likely to report experiencing some level of food insecurity in comparison to individuals without these experiences (Sun et al., 2015;2016). However, previous research has not shown a moderation by mental health symptoms on childhood maltreatment and food insecurity. This specific moderation is important to note when it comes to interventions that may be used to assist those who are experiencing food insecurity as an adult.

While this study did find new relationships between these variables, it is important to note that no study is without its limitations. One limitation of this study was that the sample size was not very large. A larger sample size gives better generalizability to the population, so further research may want to use a larger sample size for this research. A second limitation was that there was not a high proportion of males in the sample. Again, it is important for samples to be as proportionate to the population as possible, so a sample with more males may help with better population generalization. A third limitation is that this research is limited by the measures that were chosen. There are other factors that may play a part in individuals' experience with food insecurity, that are equally important as what this research has found. Further research could look at further explanations for these experiences, such as socioeconomic status. One last limitation is that this research used a convenience sample of college students in an Introduction Psychology class. While many studies do use college students as their participants, they may not be the most representative of the entire United States population. Further research could look at these relationships among individuals who are not current college students.

Implications

This research has many important implications for both future research and interventions used for individuals who are experiencing food insecurity as adults. As stated in the discussion section, there are many further directions that research can go in to find more information about food insecurity to help these individuals. It is important for future research to look into how college students specifically can be helped with food insecurity. One example would be looking at how mental health services could help them. This research is very valuable, as of course no one should have to experience food insecurity. An important implication of these findings has have to do with how people who experience food insecurity are helped. If it is known that mental health symptoms moderate the relationship between a history of physical neglect and food insecurity, interventions can be made to better help the people who have these experiences. For example, those who have food insecurity may be helped more with their symptoms of anxiety to decrease these. With a decrease in anxiety symptoms, individuals may also find a decrease in the level of food insecurity that they are facing.

Appendix A

IRB Authorization

UNIVERSITY OF
NORTHERN COLORADO
Institutional Review Board

Date:	08/11/2022
Principal Investigator:	Marilyn Welsh
Committee Action:	**IRB EXEMPT DETERMINATION – New Protocol**
Action Date:	08/11/2022
Protocol Number:	2208042022
Protocol Title:	Early Stressful Life Experiences, Current Adaptation, and Resilience
Expiration Date:	

The University of Northern Colorado Institutional Review Board has reviewed your protocol and determined your project to be exempt under 45 CFR 46.104(d)(702) for research involving

Category 2 (2018): EDUCATIONAL TESTS, SURVEYS, INTERVIEWS, OR OBSERVATIONS OF PUBLIC BEHAVIOR. Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

You may begin conducting your research as outlined in your protocol. Your study does not require further review from the IRB, unless changes need to be made to your approved protocol.

As the Principal Investigator (PI), you are still responsible for contacting the UNC IRB office if and when:

Carter Hall 2008 | Campus Box 143 | Greeley, CO 80639 | Office 970-351-1910

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

- You wish to deviate from the described protocol and would like to formally submit a modification request. Prior IRB approval must be obtained before any changes can be implemented (except to eliminate an immediate hazard to research participants).
- You make changes to the research personnel working on this study (add or drop research staff on this protocol).
- At the end of the study or before you leave The University of Northern Colorado and are no longer a student or employee, to request your protocol be closed. *You cannot continue to reference UNC on any documents (including the informed consent form) or conduct the study under the auspices of UNC if you are no longer a student/employee of this university.
- You have received or have been made aware of any complaints, problems, or adverse events that are related or possibly related to participation in the research.

If you have any questions, please contact the Research Compliance Manager, Nicole Morse, at 970-351-1910 or via e-mail at nicole.morse@unco.edu. Additional information concerning the requirements for the protection of human subjects may be found at the Office of Human Research Protection website - http://hhs.gov/ohrp/ and https://www.unco.edu/research/research-integrity-and-compliance/institutional-review-board/.

Sincerely,

Nicole Morse
Research Compliance Manager

University of Northern Colorado: FWA00000784

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