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# Food for Thought: The Effects of Past and Present Food Insecurity on Subjective Well-Being and Child Behavior

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Food for Thought:

The Effects of Past and Present Food Insecurity on Subjective Well-Being and Child Behavior

by

Jena Styka

Presented in Partial Fulfillment of the

Requirements of Independent Study Thesis Research

Supervised by

Evan A. Wilhelms

Department of Psychology

2017-2018

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### Abstract

Food insecurity arises when one does not have physical, social, or economic access to safe, sufficient, and nutritious food. According to the United States Department of Agriculture (2016), food insecurity affects 15.6 million U.S. households. Its effects go beyond the physical consequences that might arise from not having adequate nutrition, influencing subjective well-being and behavior in both adults and children. This 2 x 2 quasi-experiment investigated how current and prior food insecurity influenced depression, anxiety, stress, life satisfaction, and happiness in parents, as well as how it influenced child behavior. Results indicated that prior experiences of food insecurity resulted in increased levels of stress, and depression. Additionally, externalized child behaviors increased from parent's past experiences of food insecurity, which potentially indicates an intergenerational effect of food insecurity. Current experiences of food insecurity resulted in increased feelings of anxiety and externalized child behaviors. This study also controlled for additional factors, including age, race, ethnicity, income level, education level and whether the participant was receiving nutritional assistance. While many of these variables also affected this study, all reported effects persisted. Overall, these results demonstrate that even when accounting for other factors associated with economic hardship, food insecurity has psychological consequences and alters child behavior. This study could suggest an increased need for appropriate mental health interventions in the early stages of child development, as well ongoing mental health support for food-insecure families.

### Food for Thought:

#### The Effects of Past and Present Food Insecurity on Subjective Well-Being and Child Behavior

In 1996, the World Food Summit was called to order by the Food and Agricultural Organization of the United Nations (FAO) in Rome, Italy to address widespread undernourishment and concerns about future food needs. At this summit, one of the most commonly accepted definitions of food security was introduced. Food security is “a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” Further, the Right to Adequate Food was formally adopted, solidifying that access to adequate nutrition is a basic human right (FAO, 2006).

Food security requires both physical and economic access to food. The World Health Organization, alongside the FAO, endorses four pillars necessary for food security: availability, accessibility, utilization, and stability. If these four characteristics cannot be met, then a community and its members are at risk of food insecurity. The first pillar, availability, emphasizes that food should be obtainable in sufficient quantities and consistently (World Health Organization, n.d.). On a national level, the United States has a sufficient food supply; however, not all people have access to this supply. The second pillar, accessibility, emphasizes that certain resources are required to obtain food (World Health Organization, n.d.). Financial access, such as having enough money to afford nutritional foods, is one of the most commonly thought of resources necessary for food security. However, infrastructural access, such as having a healthy food provider within the community and the means of transportation to get there, is equally as important. Even if food is available and accessible, the third pillar, utilization, emphasizes that food must be used safely, through sanitary practices and ways in which there is nutritional gain.

The final pillar, stability, brings together these three other pillars, emphasizing that the food supply must always be available, accessible and utilized appropriately, including in emergencies and times of need (World Health Organization, n.d.). These four pillars align well with the World Food Summit definition of food security, both of which emphasize physical availability, as well as the need for social and economic access to nutritious foods at all times.

In 2016, the United States Department of Agriculture (USDA) reported that 15.6 million (12.3%) U.S. households were food-insecure at some point during the year. Such households may have experienced an uncertainty in food attainment and/or a disruption in eating patterns. These characteristics violate the criteria set forth by the FAO's four pillars of food security and the World Food Summit definition, mainly inhibiting stable access to food within these households. Of these American households, 4.9% experienced very high food insecurity, which is often uniquely characterized by hunger, a somatic feeling of discomfort or weakness caused by lack of food (USDA, 2016; USDA, 2017a). Food insecurity also varies greatly by race and ethnicity. Food insecurity affected 22.5% of non-Hispanic, Black households, and 18.5% of Hispanic households in 2016. These rates were above the national average and much higher than in non-Hispanic, White households (9.3%; USDA, 2016).

Food insecurity rates are not stable; they are higher now than they were at the start of the millennium. In the early 2000s, food insecurity rates were around 10%, following a general trend of decline in food insecurity since 1995. However, rates started to increase in 2004, and peaked during the 2008 recession, exceeding 14%. These high rates continued through 2010 but started to decline again in 2011, a trend which continues today. Even with this decline, food insecurity still affects as many as 1 in 5 Americans (USDA, 2016). Consistently high levels of



food insecurity that vary based on the economy and various social factors show that it is not an easily fixed and highly complex issue.

For families living with children, rates of food insecurity are even higher, affecting 16.5% of food-insecure households with children (6 million households; USDA, 2016). In many food-insecure households with children, parents are typically the ones most heavily affected, reducing their own food intake to ensure that their children are protected from the physical effects of food insecurity (Althoff, Ametti, & Bertmann, 2016). However, in half of all food-insecure households with children, all members, both children and parents, experienced a reduction in their food intake and/or disrupted eating patterns (3.1 million households; USDA, 2016). Additionally, parents often struggle with food insecurity and the frustration that comes with it, which in turn may also affect their child physically, socially, and emotionally (Knowles, Rabinowich, Ettinger de Cuba, Cutts, & Chilton, 2016).

In her 1991 research, Campbell became one of the first to introduce a comprehensive model of food insecurity that reflected upon the consequences of food insecurity beyond the direct impairments to nutritional status. What she found was that food insecurity resulted in two types of problems. The first is undernourishment, which is a direct, physical consequence of not eating enough proper, healthy foods for adequate nutrition. The second of these consequences encompasses the social and mental declines that might arise. What Campbell emphasized in her framework was that food insecurity goes further than just having physical effects on the body. Food insecurity has both a direct and indirect influence on one's mental and social well-being as well (Olson, 1999).

While food insecurity may result from environmental factors, such as famine, or socio-political factors, such as war, food insecurity in the United States most often does not arise from

extreme events, such as these. Rather, most cases of food insecurity in the United States result from and accompany other economic hardships, such as having limited financial means or loss of employment. To meet household needs, parents often make trade-offs. Families may have to prioritize needs, deciding where to dedicate limited resources. Some families may not be able to pay bills in order to afford food for the month, or they may need to cover health costs before they can buy food (Knowles et al., 2016). Additionally, many parents may choose to sacrifice their own meals in order to provide enough food for their children, meaning that parents often take on an additional burden to protect their children (Althoff et al., 2016). Such trade-offs are threatening to the physically and mentally health of both children and their parents (Knowles et al., 2016).

Food insecurity can have both direct and indirect, immediate and long-term effects on the physical and psychological well-being of both children and adults. In terms of physical health consequences, food insecurity can impair child development, increase the likelihood of obesity, and moreover, leave lifelong physical changes.

### **Physical Effects of Food Insecurity**

Because of the biological need for food and nutrition, effects arise in its absence. From an early age, food insecurity can alter physical health. Studies have found increased poor health outcomes, such as vitamin deficiency, acute illness, chronic illness, and infection in young children from food-insecure households (Bronte-Tinkew, Zaslow, Capps, Horowitz, & McNamara, 2007). In their 2004 study, Casey et al. found that infants and toddlers who lived in food-insecure households were nearly twice as likely to have health that was reported by parents as “fair” or “poor” (compared to “good,” “very good,” or “excellent”) and three times as likely to have been hospitalized since birth. Additionally, school-aged children from highly food-insecure

families were significantly more likely to have a chronic illness than their food-secure peers (Weinreb et al., 2002).

In addition to direct exposure, food insecurity during pregnancy can have lasting results. Children of these pregnancies were more likely to have been born with a birth defects (Carmichael et al., 2007). Further, in pregnancies characterized by hunger, the children were more likely to have been born underweight (Weinreb et al., 2002). Because underweight babies do not have the same strength as babies born at a normal weight, they have more difficulties with eating, weight gain, fighting infection, breathing, retaining body heat and are at higher risk for Sudden Infant Death Syndrome (SIDS) (Children's Hospital of Philadelphia, n.d.).

The physical effects of food insecurity extend beyond childhood, affecting adults as well. Food-insecure individuals were significantly more likely to self-report their health as "fair" or "poor" than food-secure counterparts (when asked to rate their health as "excellent," "very good," "good," "fair," or "poor"; Siefert, Heflin, Corcoran, & Williams, 2001; Stuff et al., 2004). Additionally, the nutritional deficits that occur from food insecurity increase the risk of chronic diseases such as cardiovascular disease, certain cancers, osteoporosis, cataracts and macular degeneration in adults, as well as create limitations in physical functioning (Siefert et al., 2001; Siefert, Heflin, Corcoran & Williams, 2004). Physical effects even persisted once food security has resumed. Young adults with a history of food insecurity had significantly higher Body Mass Indices (BMIs) and higher waist-to-height ratios than individuals who had grown up in food secure households. These young adults were also more likely to experience an eating disorder (Darling, Fahrenkamp, Wilson, D'Auria, & Sato, 2017).

### **Emotional and Behavioral Effects of Food Insecurity**

While physical effects of food insecurity would not come as a surprise to most, food insecurity also has dramatic effects on the social, emotional and behavioral well-being of adults and children. As mentioned previously, Campbell (1991) modeled the consequences of food insecurity beyond malnutrition. These consequences included declines in well-being and quality of life, such as physical impairments, social isolation and psychological instability (Olson, 1999; Ihab et al., 2013).

**Food insecurity in adulthood.** Adults and parents often experience the effects of food insecurity in their daily lives, as they work to protect their families from the consequences of food insecurity. Constantly needing to make hard decisions for the future of the family, food insecurity is not an easily avoidable aspect of familial life. Thus, it is understandable that food insecurity may be a source of chronic stress and have consequences on the subjective well-being of parents.

**Subjective well-being.** Thought to be largely due to the stress incurred by living with food insecurity, individuals experiencing food insecurity have been found to have differential subjective well-being, experiencing poorer quality of life and increased negative affect, than food-secure peers (Mammen et al., 2009). A growing body of literature is investigating these psychological consequences of food insecurity by looking specifically at experiences of depression, anxiety, and stress.

According to the National Institute of Mental Health, depression is a mood disorder characterized by feelings of sadness, hopelessness, and fatigue, as well as difficulty sleeping and appetite changes (National Institute of Mental Health, 2016). It is one of the most common mental illnesses in the United States. In 2015, 6.7% of the population had experienced a Major

Depressive episode in the last 12 months. Additionally, it disproportionately affects women over men at a rate of 2:1 (National Institute of Mental Health, 2015).

Depression is comorbid with anxiety, which is an emotional state characterized by tension and worry. Feelings of anxiety are normal, but people may also have an anxiety disorder which is associated with intense, intrusive thoughts of worry and concern, as well as physical sensations such as sweating, trembling and rapid heartbeat (American Psychological Association, n.d.). On a neurological level, one theory is that the occurrence of anxiety is induced by dysregulation of the hypothalamic-pituitary-adrenocortical (HPA) axis, a brain region highly responsive to stress and thought to be a key player in depression (Siefert et al., 2004).

Experiences of depression and anxiety are often related to one another, as both are believed to occur due to changes in the serotonergic and noradrenergic systems in the brain, where chemical imbalances result in higher levels of depression and anxiety (Ressler & Nemeroff, 2000). The overlap between the two diagnoses has been found to be as high as 58% when looking at subjects with Major Depressive Disorder who also met the criteria for any anxiety disorder, though percentages vary depending on what disorders are studied (Goodwin, 2015).

Stress is comprised of the body's physical, psychological and emotional responses to situations that exceed one's normal coping abilities (Gerrig & Zimbardo, 2002). Not all stress is bad, such as when taking a test, or in a threatening situation. Stress heightens the senses and encourages attentiveness. However, chronic stress can negatively affect the health and well-being of an individual (National Institute of Mental Health, n.d.). As stated earlier, food insecurity often acts as a form of chronic stress, which in turn may increase symptoms of depression and anxiety.

Researchers have found that food insecurity and the prevalence of negative emotional states can be seen in both clinical diagnoses and symptomatic indicators. Clinical diagnoses of affective and mood disorders such as Major Depressive Disorder or General Anxiety Disorder require a certain level of severity, and multiple symptoms. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria is generally accepted when diagnosing mental disorders. For a Major Depressive Disorder diagnosis, a depressed mood, or lack of interest or pleasure must occur every day, in addition to other potential symptoms such as weight loss, insomnia, agitation, or a sense of worthlessness (Reynolds & Kamphaus, 2013b). Anxiety disorders, characterized by the presence of at least three of the following: restlessness, fatigue, irritability, muscle tension, sleep disturbance or difficulty concentrating, must occur more days than not (Reynolds & Kamphaus, 2013b).

Evidence demonstrates that clinical diagnoses of various affective disorders are correlated with food insecurity. Whitaker et al. (2006) surveyed 2,870 mothers using the U.S. Household Food Security Survey Module and the Composite International Diagnostic Interview Short Form. They found that the percentage of women who experienced Major Depressive episodes or Generalized Anxiety Disorder increased with decreasing food security (Whitaker et al., 2006). Mothers of food-insecure households were also more likely to have a lifetime diagnosis of Post-Traumatic Stress Disorder (PTSD), as well as substance abuse (Weinreb et al., 2002). Outside of the U.S., such findings persist. In a study of South African citizens, diagnoses of mental illness (according to DSM-4) within in the last 12 months and over one's lifetime were associated with food insecurity (Sorsdahl et al., 2009).

While a certain level of severity is paired with a clinical diagnosis, there is still value in self-reported symptoms of depression and anxiety. One important reason to acknowledge that

clinical diagnoses are not the only way to understand one's psychological experiences is due to the lack of access to healthcare, especially mental health care. Limited access to healthcare is especially prevalent for those of low-socioeconomic status, who are also more likely to be food-insecure (Andrulis, 1998).

A common way to evaluate mental health in a research study is for researchers to administer an evaluation (often using subjective, self-evaluation) for symptoms associated with the disorder. While this kind of evaluation does not necessarily equate to a clinical diagnosis, they provide valuable insight into the psychology and mental well-being of an individual and encompass individuals who may not have access to proper healthcare for a diagnosis (Darling et al., 2017). Because these measures often rely on subjective well-being, people may perceive their own well-being and vulnerability differently from one another, even if their situations are the same. Thus, adults who perceive their stress to be at high levels are more likely to experience the negative mental consequences of it (Martin, Maddocks, Chen, Gilman, & Colman, 2016). This remains true for adults in food-insecure situations. Because adults need to provide food for the family, given limited means, they are often aware of, and confronted by, the stress of food insecurity. This could be one reason why adults in food-insecure households experience more negative affect.

Regardless of the reason, various studies have found that members of food-insecure households are significantly more likely to exhibit symptoms of depression, anxiety, stress and emotional distress than food secure counterparts (Seifert et al., 2004; Heflin & Ziliak, 2008; Knowles et al., 2016; Martin et al., 2016; Weigel, Armijos, Racines, Cevallos, & Castro, 2016). Other studies have found similar effects while looking solely at symptoms of depression (Siefert et al. 2001; Heflin, Siefert, & Williams, 2005; Munger, Hofferth, & Grutzmacher, 2016). Due to

the overlap between diagnoses, parents describing depressive symptoms were also likely to describe symptoms of stress, which increased even more when parents also described situations of food insecurity (Knowles et al., 2016). Those in food-insecure households were also more likely to have experienced recent events such as losing a job, gaining a household member or losing food stamps, which further stress a household's budget and members (Rose, 1999). Additionally, weak social networks accompanied feelings of depression and stress (Knowles et al., 2016).

Chronic illness and food insecurity also couple together and negatively affect subjective well-being. In patients with diabetes, the prevalence of depression increased alongside higher levels of diabetes distress in individuals from food-insecure households as opposed to food-secure households (Silverman et al., 2015). Diabetes distress is a diabetes-specific emotional state that is often associated with feelings of depression, anxiety, and stress, which arises from the day-to-day life of living with the chronic disease (Gebel, 2013). Additionally, in patients living with HIV, mental health-related quality of life was also decreased with increasing levels of food insecurity (Choi et al., 2015). This adds to evidence that food insecurity increases negative emotional states.

When screening parents for psychological distress using the K-6 Scale, which is a nonspecific distress scale, both mothers and fathers of food-insecure households had significantly higher levels of severe psychological distress (SPD) (Tseng, Park, Shearston, Lee, & Weitzman, 2017; Prochaska, Sung, Max, Shi, & Ong, 2012). While SPD is non-specific, the K-6 Scale can distinguish clinically significant cases of severe mental illness from other cases (Harvard Medical School, 2005). Interestingly, this study found that fathers in food-insecure households were at a higher risk of SPD than mothers. Previous literature relating to food



insecurity often neglects to look directly into fathers' mental health, often assuming that the largest effect will be seen in mothers. This study provides evidence that this may not always be true, and fathers may be equally, if not more, at risk for decreased mental well-being in food-insecure households (Tseng et al., 2017). Sex differences between males and females can also be found in food-insecure situations. Mental illness among these individuals was 18.4% higher in females and 13.5% higher in males from food-insecure households. Additionally, food insecurity was associated with higher rates of stress and a weaker sense of community belonging (Martin et al., 2016). This study reiterates that males and females may experience food insecurity differently and see differential mental health outcomes. The two studies, however, from Martin et al. (2016), and Tseng et al. (2017) counter one another. Tseng et al. (2017) found that men may experience food insecurity with higher levels of psychological distress, while in the later study, women were more likely to experience mental illness. Such contradictions could emphasize the need for more research into these differential effects of sex and food insecurity.

Researchers have also looked at depression and food insecurity from the opposite direction, looking at how depression increased the likelihood of food insecurity. One study found that maternal depression increased the likelihood of subsequent food insecurity, and severe parental depression increased the likelihood of child food insecurity. However, this study did not control for confounds, but acknowledges that mothers experiencing both depression and food insecurity were also more likely to be young, less educated, domestically born, unmarried (yet cohabiting), on Medicaid at the time of their child's birth, and less likely to have lived with both parents at age 16 in this sample. Such confounds could potentially remove the effects of the study, though such tests were not run (Noonan, Corman, & Reichman, 2016). Wiegel et al. (2016) also found an association between mental health and food insecurity in Ecuadorian

women. They rationalized that individuals suffering from mental illness, such as depression and anxiety, may not be able to maintain employment or perform important daily functions in the household, such as meal preparation, because of the self-care required for their mental illness. In which case, poor mental health would lead to food insecurity (Weigel et al., 2016).

**Parenting.** Food insecurity and the stress it imposes can affect even more than subjective well-being, by also altering behaviors. One major area of change is in parenting styles. Food insecurity has been found to lead to inconsistent and poor parenting, which results in poorer infant feeding patterns. Poor infant feeding patterns have lasting consequences on child development, increasing the likelihood of being overweight, developing an acute or chronic disease or decreasing cognitive function (Bronte-Tinkew et al., 2007; American Academy of Pediatrics, 1997). Additionally, parents experiencing hard economic situations, such as food insecurity, are more likely to exhibit inconsistent, harsh and punitive disciplinary strategies which in turn lead to antisocial behavior and socioemotional problems in their children (Slack & Yoo, 2005).

Maternal depression is also common among mothers of young children, even those who are not facing economic hardship (Ke & Ford-Jones, 2015). Parents with depressive symptoms were found to exhibit fewer positive behaviors, which can negatively impact their parent-child relationship (Bronte-Tinkew et al., 2007). As parental stress and symptoms of depression increase, these parent-child relationships weaken while more authoritative parenting styles appear, characterized by threats, shaming, and punishment to reinforce behaviors (Slack & Yoo, 2005). This may not only mean that parenting behaviors are altered, but also that the child has a weaker attachment to their parents (Ke & Ford-Jones, 2015). Parental mental health is also a key predictor of child mental health because of the way it affects parenting. As food insecurity may

decrease mental well-being in adults, then it also seems plausible that child well-being may be affected as well (Althoff et al., 2016).

**Food insecurity in childhood.** As stated earlier, children are often protected by their parents from the direct consequences of food insecurity, such as reduced food availability and meal pattern disruption. However, situations of food insecurity and the accompanying experiences of poverty and economic hardship may still act as stressors throughout one's childhood. This could be due to direct perception of familial stress induced by such hardships, or by the indirect behavioral changes in their parents, such as alterations in parenting styles or emotional well-being. While researchers often turn to parents to learn about a child's experience growing up, research shows that parents and children view their situations differently. Children self-report having cognitive, emotional, and physical awareness of their family's food security status, even if parents report efforts to offset the effects. This is because parents often think they have protected their children from these experiences, when their child might be otherwise aware. Children in food-insecure households are often aware of how their parents attempt to manage food resources, as well as feel the worry, sadness, and anger that accompanies food insecurity. Additionally, children may alter their own eating habits to help alleviate stress on their parents, by not asking for a snack or eating less at meals, even when not prompted (Fram et al., 2011).

**Subjective well-being.** Not only are children aware of their family's food status, but are also affected by the consequences, regardless of their parents' attempt to shield them. Althoff et al. (2016) found that children who self-reported food insecurity experienced more emotional symptoms, such as irritability and nervousness, as well as more life dissatisfaction on a weekly basis than self-reported food-secure children (even when adjusting for age and socioeconomic

status). Even in a cross-cultural study of 32 countries, lower life satisfaction remained associated with food insecurity (Mammen, Bauer, & Richards, 2009).

Additionally, children in food-insecure households, particularly those experiencing hunger, demonstrated increased feelings of depression, anxiety, and stress. School-aged children in food-insecure households were also more likely to experience other stressful life events in addition to their lack of food security, such as loss of household employment. This heightened stress, whether from food insecurity or other economic hardships, may be linked to the significantly higher rates of anxiety and depression found in the food-insecure school-aged sample (Weinreb et al., 2002). In the broader sense of mental health, increasing levels of food insecurity were associated with increased odds that an adolescent had experienced a mental health disorder in the past year, such as an anxiety disorder, behavior disorder or substance abuse disorder. Those with the highest levels of food insecurity had the highest chance of experiencing mental distress. This remained true even when controlling for poverty and socioeconomic status (McLaughlin et al., 2012).

Not only was their subjective perception of their mental health altered by reported food insecurity, but also their clinical needs. Food insecurity increased negative mood, anxiety disorders, behavior disorder and substance abuse disorder, and was associated with increased use of ambulatory services for mental disorders (Althoff et al., 2016). Children in households below the poverty level, specifically characterized by hunger, were also more likely to have a history of visiting a mental health counselor or psychologist than children who were not identified as being hungry (Slack & Yoo, 2005).

On a neurological level, food insecurity acts as a stressor on children and their developing brains. Children with a low socioeconomic status, another stressor related to food

insecurity, had significantly higher levels of cortisol in the brain, a naturally-produced steroid hormone that is released as part of the body's stress response, when compared to food secure peers. Such effects have been seen in children as young as 6 years old. Continuously high levels of cortisol in the brain, whether it be from economic hardship or any other form of continuous exposure to stress, have been linked to depression, cognitive deficits, and neuronal atrophy (Jyoti, Frongillo, & Jones, 2005). Thus, one can deduce that continuous exposure to economic hardship increases cortisol in the brain and can have cognitive consequences.

*Child behavior.* When looking at child behavior, there are two broad categories of behavior disorders: internalized behavior disorders and externalized behavior disorders, which can be exhibited by children. Internalized behaviors are projected inward, such as social withdrawal, anxiety, and depression, and can typically be identified by the presence of sadness, anxiety, fear and distress. Oppositely, externalized behaviors are projected outward, such as delinquency and aggression, and can be predicted by feelings of irritability, frustration, and anger (Eisenberg et al., 2001). Such behaviors are associated with decreased development of social skills and weaker academic performance in children (Jyoti et al., 2005).

Studies that look at internalized and externalized behaviors in children consistently find that both appear present in children growing up in food-insecure households (Slopen et al., 2010; Whitaker, Phillips, & Orzol, 2006). These behaviors increase with severity of food insecurity. In children in food secure homes, 22.7% were found to exhibit at least one type of behavioral problem: aggression, anxiety/depression, or inattention/hyperactivity, as identified on the Child Behavior Checklist, used to assess behavioral and emotional problems. For children in food-insecure families, however, this raised to 36.7% (Whitaker, Phillips, & Orzol, 2006). A study conducted with a sample of 2,810 children between the ages of 4-14 found that children who

came from persistently food-insecure homes were 1.47 times more likely to exhibit internalized behaviors, and 2.01 times more likely to exhibit externalized behaviors. Even when controlling for whether a child was living in poverty, such results persisted (Slopen et al., 2010).

There also appears to be a potential effect of food insecurity which decreases social skill development. Jyoti et al. (2005), found that even when accounting for confounds such as disability status, household size, marital status, employment status, insurance, depression experiences and education, girls in households becoming more food-insecure over the course of three years saw less development in social skills than both food-secure peers and persistently food-insecure peers. This might demonstrate that the stress and anxiety induced by fluctuating levels of food insecurity could alter social skill development in girls. Interestingly, for boys, there was no difference in social skills between boys in households that were food-secure, persistently food-insecure or transitioning between states of food insecurity. This finding has not been replicated. One potential reason for the differences found in this study could be that boys and girls are differentially affected by stress. Additional literature in the field has found that children in food-insecure households exhibited decreased positive behaviors, social skills, and greater difficulty working with other children. This demonstrates that food insecurity acts as an important marker, and can influence the trajectory of, child development (Jyoti et al., 2005).

At the preschool level, young children in food-insecure households exhibited poorer play behaviors, poorer preschool achievement and lower levels of development than food-secure peers (Slack & Yoo, 2005). Ammen, Bauer, and Richards (2008) also found that children in food-insecure households were more likely to experience adverse developmental outcomes, including decreased performance in school. Similar results were found when looking at academic performance and externalized behaviors in children in food-insecure households,

where food insecurity was associated with increased externalized behavior and decreased academic performance (Masten et al., 2005). Decreased performance academically was found for both sexes, who demonstrated poorer reading performance and comprehension, as well as lower math scores. These results, however, were especially apparent in young girls (Jyoti et al., 2005).

Even when children receive assistance to help mediate the effects of food insecurity, children still may exhibit differential behaviors from food-secure peers. Dunifon & Kowaleski-Jones (2003), in their study of school-aged children participating in the National School Lunch Program, found that participation was associated with increased externalized behaviors and decreased positive behaviors. The researchers, however, concluded that these results were not likely the outcomes of the program. Rather, food-insecure households are more likely to be participating in the program, and thus it may be the food insecurity that is influencing these behaviors. The researchers further suggested that other, unmeasured aspects of one's socioeconomic status may be playing into these results, as well as the possibility that food assistance does not adequately alleviate the consequences of food insecurity (Dunifon & Kowaleski-Jones, 2003).

### **Long-Term Effects of Food Insecurity**

Siefert et al. (2004) hypothesized that in situations of short-term food insecurity, the long-lasting effects are minimal. In their study of food insufficiency, they found that those who had reported short-term food insecurity reported no significant difference between their symptoms of depression and those who had never been food-insecure. Other studies, however, have found that even one episode of food insecurity can have lasting consequences (Darling et al., 2017). Whitaker et al. (2006) proposed the early life stress hypothesis, which predicted that

long-term mental health problems arise from childhood experiences of food insecurity (McIntyre, Williams, Lavorato, & Patten, 2012). As demonstrated by the immediate psychological consequences of food insecurity, both children and adults are affected by situations of food insecurity, however, it is also important to consider the role of early life experiences and how they may influence later life experiences in unseen ways.

Such a hypothesis has evidence to support it, though research is limited in the area. Melchoir et al. (2012) screened a sample of 2,100 children at the ages of 1, and again at 4, for food insecurity. What researchers found was a unique trajectory for children who had experienced food insecurity, where children that had lived in food-insecure situations, regardless of if they were currently experiencing it, were more likely to experience persistent depression and anxiety, as well as hyperactivity and inattention (Melchoir et al., 2012). Such data could provide evidence to the long-lasting effects of early life exposure to food insecurity.

These effects were explored further in a young adult sample of incoming college freshmen. Students that had experienced at least one episode of prior food insecurity, as identified by the Core Food Security Screener, including those that now felt they were food-secure, were significantly more likely to self-report depressive symptoms and higher stress. Interestingly, there were no significant differences between prior food-insecure and food-secure students pertaining to anxiety (Darling et al., 2017). Increased anxiety could be a unique effect of current food insecurity. On a more pressing level, prior experiences of food insecurity and hunger increased the risk of suicide ideation in adolescents and young adults (McIntyre et al., 2012).



### **Nutrition Assistance Programs**

In an attempt to alleviate food insecurity, supplemental nutrition programs have been developed and implemented, many of which are federally funded programs that provide a safety net for individuals by increasing physical and financial access to food. The most common program is the Supplemental Nutrition Assistance Program (SNAPs) which aided over 44 million participants, or over 21 million households in 2016 (USDA, 2017b). In 2014 alone, the program lifted 4.7 million Americans out of poverty, including 2.1 million children, and keeps millions of other Americans out of poverty each year (Furman, Munox, & Black, 2015). Additional programs such as the Special Supplemental Food Program for Women, Infants, and Children (WIC), the National School Lunch Program and the School Breakfast Program also provide special assistance to eligible families.

These nutritional assistance programs have been studied to see if they address food insecurity and its subsequent effects. When looking at the SNAPs program, the USDA found that program participation for 6 months, both in a cross-sectional study and a longitudinal study, was associated with a 5-10% decrease in the percentage households that identified as food-insecure, effectively targeting households with “very low food insecurity” and households with children. Additionally, participants experienced decreased feelings of nervousness, restlessness, fidgeting, hopelessness, worthlessness and various other negative emotions. Such feelings are often symptomatic of depression and anxiety, demonstrating that SNAPs may effectively improve not just one’s nutritional status but also the negative affect that has been found to increase from food insecurity (Mabli, Ohls, Dragoset, Castner, & Santos, 2013). Another study, similarly, found that SNAPs participation decreased the probability of depression (Munger et al., 2016).

The positive effects of assistance programs have also been found through a lack of significant results. Casey et al. (2004) hypothesized that they would find poorer development in children who were from food-insecure households. However, they found no significant difference in child development, but they attributed this to the fact that 79% of their sample received WIC benefits, once again demonstrating the potential positive outcomes of such interventions (Casey et al., 2004). No further research has been conducted to identify the long-term effects of these programs on subjective well-being.

One study, however, found opposing results. Heflin and Ziliak (2008) found that more emotional distress was experienced by individuals who participated in the Food Stamps Program, now known as SNAPs, and that this amount of distress positively correlated with the amount of assistance an individual was receiving. This distress was especially apparent in individuals who were just starting their participation in the program. The researchers acknowledged that this could be related to the adaptive skills that one picks up through participation in the Food Stamp Program, with longer participation giving them the skills to navigate the system with more ease (Heflin & Ziliak, 2008). This research, however, does not consider that individuals receiving more money may be experiencing more distress because the economic hardship they experience may be greater than someone in need of less assistance. An additional consideration when reading literature on nutrition assistance programs is that their funding and outreach are constantly changing.

### **Potential Confounds**

Food insecurity is one of many ways a household may be negatively influenced by economic hardship. Thus, when studying it, it is important to be aware of other potential variables that may be influencing the way someone lives, thinks and behaviors when

experiencing food insecurity. Because food insecurity cannot be ethically replicated in an experimental design in humans and thus must be studied in pre-established groups, it's important to focus on food insecurity as a separate variable rather than as synonymous with poverty or low socioeconomic status (Slack & Yoo, 2005). In 2005, 42% of households that experienced food insecurity fell below the poverty line (Mammen et al., 2009). While this indicates that there is an overlap between income and food insecurity, families may not have adequate access to food and yet still be financially sound, or they may have access to food even if they are not economically flourishing (Slack & Yoo, 2005). This relates back to the FAO's four pillars of food insecurity, who emphasized that access to food is not only based on having financial capabilities, but also being within a geographic area that permits it, and having the skills and knowledge to use it properly (FAO, 2006).

**Race and ethnicity.** As stated in the initial pages of this report, rates of food insecurity are higher among people who identify as minorities than among White individuals (USDA, 2016). In addition to this, people who identify as a minority also had a higher rate of depression and depression-related symptoms than White peers (Dunlop, Song, Lyons, Manheim, & Chang, 2003). These two overlapping factors, that people who identify as a minority are more likely to be food insecure, and more likely to experience depression, make it a potential confound in this study.

**Socioeconomic status.** While research shows the relationships between food insecurity and various psychosocial factors, oftentimes similar data can be gathered when looking at other contributors to chronic stress and hardship. One example of this is that behavioral problems in children can often be found in children of low socioeconomic status and those receiving welfare assistance, regardless of food security (Slack & Yoo, 2005). However, even when accounting

for socioeconomic factors, as well as maternal health (physical health, mental health, alcohol use, drug use, smoking and domestic violence), behavioral problems still increased with increasing food insecurity. This demonstrates that food insecurity effects are separate from socioeconomic status and still affect the behavior of children (Whitaker et al., 2006).

**Household structure.** Household structure, such as whether one grows up in a two-parent household or single-parent household, as well as if they have siblings, can influence food insecurity and psychosocial factors (Slack & Yoo, 2005). Of households with a single mother, 31.6% experienced food insecurity (USDA, 2016). Once again looking at behavior problems, externalized behaviors, are higher among children raised by a single parent. However, internalized behaviors are higher among cohabiting families. Additionally, a large family size results in decreased internalized behaviors, likely due to a child's need to be assertive when competing with other children (Slack & Yoo, 2005).

Through proper statistical analyses, this research will attempt to account for these confounds by controlling for age, race, ethnicity, income level, educational status, marital status, and sex. Additionally, this study controlled for whether a participant was receiving nutrition assistance. This will allow the researcher to independently draw conclusions on food insecurity as a separate variable from these confounds.

### **Direction of This Study**

To summarize, 12.3% of U.S. households experienced food insecurity in 2016, a number which would increase when looking at lifetime occurrence of food insecurity (USDA, 2016). Research on this population provides evidence that food insecurity not only decreases physical well-being brought on by poor access to nutrition, but may also affect parental mental health and child behavior. More specifically, parents living in a food-insecure household are more likely to

experience feelings of depression, anxiety, and stress, while children are more likely to exhibit externalized and internalized behavior disorders. Such experiences of negative affect may continue to exist once food security has returned. Additionally, literature has found a relationship between food insecurity and parenting styles, and how parents engage with their children. Limited research has found that participation in food assistance programs, such as the Supplemental Nutrition Assistance Program (SNAP) may offset these experiences. Additionally, prior food security can have lasting effects. Even once someone has returned to a state of food security, individuals that have experienced food insecurity are more likely to exhibit depressive symptoms and stress.

This present study sought to expand research conducted by Darling et al. (2017), who found that prior food insecurity had negative consequences on the psychological and physical well-being of young adults, particularly increasing BMI, the risk of an eating disorders, depression, and stress. This study expanded on this by comparing how both prior and current experiences of food insecurity influence feelings of happiness, life satisfaction, depression, anxiety and stress in parents with children under the age of 18. This study also looked at the presence of different child behavioral factors to see how the presence of externalized and internalized behaviors aligned with their parent's food security status. This allowed for a unique look at how current and past experiences of food insecurity differentially affect one's well-being, as well as the immediate and long-lasting effects of food insecurity. Little research has been done on the lasting effects it can have on individuals, thus this study added to a small, but growing body of literature on the effects of food security on long-term mental well-being.

Based on the research reviewed above, this study hypothesized: (1) Food insecurity would be related to increased feelings of depression, anxiety, and stress, as well as decreased

feelings of life satisfaction and happiness in parents. In parents for whom food insecurity once existed but no longer exists, experiences of depression, anxiety and stress would be higher than in parents who had never experienced food insecurity, but lower than parents who were currently food-insecure. (2) Food insecurity would increase externalized and internalized behaviors in children, including in families where food security once existed but did not currently exist. (3) Food-insecure participants in nutritional assistance programs would have reduced depression, anxiety and stress, as well as more life satisfaction and happiness, compared to non-participating, food-insecure counterparts. Food-secure participants would have the lowest levels of depression, anxiety, and stress, as well as the highest life satisfaction and happiness among all groups.

## **Method**

### **Participants**

Initially, 148 participants completed the survey; however, 16 participants were removed from the study due to failing the attention check question on the survey. If they failed to answer the question correctly, it demonstrated a potential lack of attentiveness to the survey, and thus they were removed. Analyses were run on both sets of data, and results were similar. Thus, removing potentially inattentive respondents increased clarity in the results. This left 132 participants, all of whom identified as parents who had children under the age of 18 living in their household. Participants were recruited through the Amazon Mechanical Turk (MTurk) system.

Of the remaining participants, 50% ( $n = 66$ ) reported current experiences of food insecurity (either high, moderate, or low), and 50% ( $n = 66$ ) did not report current food insecurity. Of the 66 participants that experienced current food insecurity, 59% ( $n = 39$ ) experienced low/moderate food insecurity, while 41% ( $n = 27$ ) experienced high food insecurity.

For analysis purposes, the two categories of high and low/moderate food insecurity were combined to create a group which was most comparable to the food-secure group. Similarly, 54% (n = 71) reported at least one prior episode of food insecurity in their lifetime, and 46% (n = 61) reported no prior experiences of food insecurity. Finally, 58.8% (n = 77) were not receiving nutritional assistance, while 41.2% (n = 54) were received at least one type of nutritional assistance.

Demographic information was provided by 129 participants. Of these respondents, 48.8% were male (n = 63) and 51.2% (n = 66) were female and the average age was 29, though parents' ages ranged from 21-55. Additionally, 78.3% (n = 101) identified as White, while 21.7% (n = 28) identified as a minority. Of those who identified as a minority, 4.5% (n = 6) identified as American Indian/Alaska Native, 3.8% (n = 5) identified as Asian, 7.6% (n = 10) identified as Black, and 3.2% (n = 4) identified as multiracial. Regardless of race, 3.9% (n = 5) identified as Hispanic or Latinx. The most commonly obtained level of education was a 4-year degree (43.4%; n = 56), followed by some college (22.5%; n = 29), a high school diploma (or equivalent; 13.2%; n = 17), a 2-year degree (10.9%; n = 14) and a professional degree (10.1%; n = 13). The most common income bracket was \$50,000-60,000 (17.8%; n = 23). Those making less than this accounted for 49.6% (n = 64) of the sample, while 32.6% (n = 42) made more than this. Finally, 77.3% (n = 99) were currently married, 16.4% (n=21) had never been married, and 6.3% (n = 8) had been previously married.

### **Design**

This study used a 2 x 2 quasi-experimental design. The first factor was a 2-level measure of prior food status: prior food insecurity or prior food security. One or more prior episodes of food insecurity, as determined by the Core Food Security Screener explained below, classified a

participant as previously food insecure. The second factor was based on a 3-level measure of current food status: low/moderate food insecurity, high food insecurity or food security, as determined by the USDA Household Food Security Questionnaire explained below. However, the small sample size, and the potential for underpowered statistics, lead researchers to collapse the categories of low/moderate food insecurity and high food insecurity into one category of current food insecurity, making this a 2-level factor. Changing these results did not appreciably affect the outcome.

To analyze this data, a correlation was run to determine the relationship between all variable. To further investigate these effects, 2 x 2 ANCOVAs were conducted on each dependent variable to determine main effects and interactions with the independent variables.

### **Materials**

Materials used in this survey were compiled into an electronic format through Qualtrics software, Version December 2017 of Qualtrics (Qualtrics, 2017). The complete survey can be found in Appendix A.

**Core food security screener.** The Core Food Security Screener is a two-item food insecurity questionnaire, which, by using a 3-point Likert scale of “often,” “sometimes,” and “never,” determines levels of food insecurity. Responses of either “sometimes” or “often” on either of the two questions indicated the presence of food insecurity. It has been found to be sensitive (97%) and specific (83%), as well as exhibits convergent validity. It was significantly associated with increased risk of reported “fair” or “poor” health, child hospitalization, caregiver depression, and developmental risks (Hager et al. 2010).

Darling et al. (2017) modified this scale to assess prior food insecurity by following-up each question with how long ago this experience occurred. They first asked each person if the



statement applied to them, and if they indicated “often” or “sometimes,” then a follow-up question asked how long ago they experienced this: 1-5 years ago, 6-10 years ago, or more than 10 years ago. This study will use the modified version to assess prior food insecurity.

**USDA household food security questionnaire (short form).** The USDA household food security questionnaire is a 6-item scale, asking “yes” or “no” questions to determine food security levels. Scores of two or more affirmative answers indicate current food insecurity. This questionnaire was found to be both sensitive (92%) and specific (99.4%) in determining food insecurity levels. The short form of the USDA food security questionnaire correctly identified 97.7% of household food security levels (95.6% of households with children, 99% of households without children; Blumberg, Bialostosky, Hamilton, & Briefel, 1999).

**Depression, anxiety and stress scale short form.** The Depression, Anxiety, and Stress Scale short form (DASS-21) is a 21-item scale which measures depression, anxiety, and stress by using subscales for each of the three factors. The scale asks participants to rate how often they feel a certain way from 1 (“never true”) to 4 (“almost always true;” Darling et al., 2017). Responses are scored by totaling the numbers in each category and multiplying by 2 (to make scores equivalent to the DASS-42 scale). The threshold for depression was any score over 9, with increasing scores indicating more severe depression. The threshold for anxiety was indicated by any score over 7, with increasing scores indicating more severe anxiety. The threshold for stress was indicated any score over 14, with increasing scores indicating more severe stress (Lovibond & Lovibond, 1995).

Each subscale is internally reliable (anxiety:  $\alpha = .87$ ; depression:  $\alpha = .94$ ; stress:  $\alpha = .91$ ), and all three subscales accurately differentiated between depression, anxiety, and stress in both community and clinical samples (Antony, Bieling, Cox, Enns, & Swinson, 1998). Additionally,

when compared to the Beck Depression and Anxiety Inventories, the DASS-21 showed greater distinction between depression, anxiety, and stress, with a higher degree of convergent validity (anxiety:  $r = .58$ ; depression:  $r = .54$ ). The DASS-21 anxiety subscale and the Beck Anxiety Inventory correlate ( $r = .81$ ), as do the DASS-21 depression subscale and the Beck Depression Inventory ( $r = .74$ ; Lovibond & Lovibond, 1993).

**Strengths and difficulties questionnaire.** The Strengths and Difficulties Questionnaire (SDQ) is a behavioral screener for children filled out by parents or teachers which looks at both positive and negative attributes of behavior. Participants rate each statement as 0 (“never true”), 1 (“sometimes true”), or 2 (“certainly true”). Total scores above 13 indicate abnormal behavior, with increasing scores indicating higher levels of abnormal behavior. The twenty-five questions can also be broken up into 5 subscales which ask about conduct problems, inattention/hyperactivity, emotional symptoms, peer problems and prosocial behaviors. Similarly, higher scores indicate more abnormal behavior in each area, except prosocial behaviors, where higher scores indicate positive behaviors. When compared to the Child Behavioral Checklist (CBCL), a similar measure of child behavior, the SDQ and CBCL correlated significantly. However, the SDQ was significantly better at detecting inactivity and hyperactivity, and was preferable for parents of low-risk children (Goodman & Scott, 1998).

For this study, the questionnaire was modified to inquire about all children in one’s household, to account for families that have multiple children. It asked if each statement was “not true of any of my children” (0), “somewhat true of at least one of my children” (1), or “certainly true of at least one of my children” (2).

**Subjective well-being.** A single-item scale was used to measure life satisfaction, asking “In general, how satisfied are you with your life?”. The single-item scale positively correlated

with the Satisfaction with Life Scale, as well as with psychological flourishing and happiness. It was also weakly to moderately associated with lower levels of anger, worry, sadness, shame, and jealousy (Cheung & Lucas, 2014). Additionally, a single-item scale was used to measure happiness. The question “Do you feel happy in general?” was shown to correlate with both the Oxford Happiness Inventory and the Satisfaction with Life Scale. The single-item scale was found to exhibit concurrent and convergent validity, as well as reliability. Moreover, it positively correlated with optimism, hope, self-esteem, positive affect, and extraversion, and negatively correlated with anxiety, pessimism, negative affect and insomnia (Abdel-Khalek, 2006).

**Demographics questionnaires.** Demographics were gathered on age, sex, race, ethnicity, education level, household income, marital status and household size through self-reported measures. Additionally, the USDA nutrition program participation questionnaire was administered, which asked about household participation in the Supplemental Nutrition Assistance Program (SNAPs), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the free or reduced breakfast and lunch programs.

### **Procedure**

The College of Wooster Human Subject Research Committee (HSRC) verified this study as exempt (Protocol ID: 2017/10/31). Following HSRC review, this study was posted using the Amazon Mechanical Turk (MTurk) system, where participants meeting the requirement of “parent with a child under the age of 18 living in a US household” were requested and able to participate in this study if they chose.

Upon interest on the MTurk website, potential participants were asked to read through the consent form. Participants who did not consent were routed out of the survey, while those

consenting continued. Participants were free to skip any question in the survey, which was indicated in the consent form and reiterated right before the DASS-21 scale. At the end of the survey, all participants were thanked for participating and presented with potential resources to receive mental support should they need it. Upon completion of the survey, compensation of \$0.65 was provided by the researcher to the participant through the MTurk system.

### Results

Two independent variables were used in this study to look at their effects on six dependent measures. The first independent variable was whether the participant currently identified as food-secure or food-insecure. The second independent variable was whether the participant had experienced prior food insecurity. Data were analyzed from 132 participants, all of whom identified as parents living with children under the age of 18 in their household.

Of the participants, 50% reported current experiences of food insecurity (either high, moderate, or low), and 50% reported no current experiences of food insecurity. Similarly, 54% reported at least one prior episode of food insecurity in their lifetime, and 46% reported no prior experiences of food insecurity. The sample size  $n$  values of each independent variable can be found in Table 1 (mean and standard deviation data can be found in Appendix B). Note that the small sample sizes for the crossover of “Prior Food Security” and “Current Food Insecurity,” as well as “Prior Food Insecurity” and “Current Food Security” made interactions between groups underpowered. Thus, when interpreting interactions, extreme caution should be used.

Table 1

*Cross Tabulation of  $n$ -values between Current and Prior Food Security Status*

Prior Food Status	Current Food Status		Total
	Current Food Security	Current Food Insecurity	
Prior Food Security	56	5	61
Prior Food Insecurity	10	61	71
Total	66	66	

To first understand this data, a correlation table was established to demonstrate the relationship between dependent variables. The results are presented in Table 2. Parental stress scores were most highly correlated with all other variables. Parental anxiety scores appeared to be the least correlated with other variables, only correlating with parental depression and child behavior.

Table 2

*Correlation Table between all Dependent Variable*

Dependent Variable	1.	2.	3.	4.	5.	6.
1. Parental Life Satisfaction	--					
2. Parental Happiness	.793**	--				
3. Parental Stress	-.409**	-.335**	--			
4. Parental Anxiety	-.145	-.162	.756**	--		
5. Parental Depression	-.376**	-.385	.804**	.824	--	
6. Child Behavior	-.106	-.128	.612**	.584**	.565**	--

Note. \*\*p < 0.01

To further test the relationships between all variables, 2 x 2 ANCOVAs were primarily used to analyze this data. This allowed for control of age, sex, race, ethnicity, education level, income level, and marital status, as well as if a participant was receiving nutritional assistance. Additional analyses were also run on the same dataset. Differences found in the 2 x 2 ANOVAs will be reported in this section. Significant effects for the 2 x 3 ANOVA can be found in Appendix C. However, due to the small sample sizes in the 3-levels, the data may be underpowered and should be interpreted with caution.

### **Parental Stress and Food Security Status**

A 2 x 2 ANCOVA was run to determine if food security status influenced parental stress. Data is presented in Table 3. There was an interaction between current and prior food security status. Of those with no prior food insecurity, current food insecurity was significantly higher

than no current food insecurity,  $p = .015$ . Additionally, of those with no current food insecurity, prior food insecurity was significantly higher than no prior food insecurity,  $p < .001$ .

Additionally, race and ethnicity reveal an effect, in which individuals who identified as members of a minority race or ethnicity group experienced more stress than White participants.

Table 3

*Parental Stress Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	3.95	.049*
Education	1	2.04	.156
Income Level	1	0.85	.357
Marriage Status	1	0.62	.433
Age	1	0.04	.838
Sex	1	1.98	.162
Assistance	1	2.59	.110
Prior Food Status	1	3.08	.082
Current Food Status	1	2.14	.146
Prior Food Status * Current Food Status	1	5.53	.020*
Error	117		

*Note.*  $R^2 = .342$  (Adjusted  $R^2 = .286$ )

\* $p < .05$ , \*\*  $p < .01$

The 2 x 2 ANOVA demonstrated slightly different results. There was a significant main effect for prior food status on parental stress,  $F(1,128) = 5.67$ ,  $p = .019$ . Those with prior experiences of food insecurity had higher levels of stress than those who had not previously experienced food insecurity. No main effect was found for current food security status,  $F(1,128) = 2.37$ ,  $p = .126$ . The significant interaction persisted,  $F(1,128) = 5.92$ ,  $p = .016$ .

### **Parental Anxiety and Food Security Status**

A 2 x 2 ANCOVA was run to determine if food security status influenced parental anxiety. Data is presented in Table 4. There was a significant main effect for current food status, where participants with current food insecurity experienced higher levels of anxiety than those with no current food insecurity.

Additionally, there was an effect of race and ethnicity, where participants who identified as a member of a minority race or ethnicity group experienced more anxiety than White participants. Additionally, there was an effect of education, where those with some college or a 4-year degree experienced higher anxiety than those with a high school degree, a 2-year degree or a professional degree. Finally, there was an effect of sex, in which males had higher anxiety than females.

Table 4

*Parental Anxiety Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	3.95	.049*
Education	1	4.50	.036*
Income Level	1	1.93	.168
Marriage Status	1	0.33	.567
Age	1	0.55	.462
Sex	1	12.07	.001**
Assistance	1	2.85	.094
Prior Food Status	1	1.45	.231
Current Food Status	1	5.44	.021*
Prior Food Status * Current Food Status	1	3.80	.054
Error	117		

*Note.*  $R^2 = .428$  (Adjusted  $R^2 = .379$ )

\* $p < .05$ , \*\* $p < .01$

The 2 x 2 ANOVA revealed differing results. There was a significant main effect for prior food status on parental anxiety,  $F(1,128) = 4.09$ ,  $p = .045$ . Those with prior experiences of food insecurity had higher anxiety scores than those with no prior food insecurity. Additionally, the significant main effect of current food status persisted,  $F(1,128) = 4.41$ ,  $p = .038$ . No significant interaction was found,  $F(1,128) = 3.00$ ,  $p = .086$ .

**Parental Depression and Food Security Status**

A 2 x 2 ANCOVA was run to determine if food security status influenced parental depression. Data is presented in Table 5. There was a main effect of prior food status, in which

prior food insecurity related to higher levels of depression than no prior food insecurity. Prior food status and current food status also significantly interacted. Of those with no prior food insecurity, participants experiencing current food insecurity had significantly higher depression scores than those not currently experiencing food insecurity,  $p = .019$ . Additionally, of those with no current food insecurity, those with prior food insecurity had significantly higher depression scores than those without prior food insecurity,  $p < .001$ .

Additionally, there was an effect of race and ethnicity, where participants who identified as a member of a minority race or ethnicity group experienced more depression than White participants. Additionally, there was an effect of education level, where those with some college or a 4-year degree experienced higher levels of depression than those with a high school degree, a 2-year degree, or a professional degree. Finally, there was an effect of sex, in which males had higher depression levels than females.

Table 5

*Parental Depression Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	4.70	.032*
Education	1	6.61	.011*
Income Level	1	2.30	.132
Marriage Status	1	2.11	.149
Age	1	0.04	.851
Sex	1	10.74	.001**
Assistance	1	1.67	.199
Prior Food Status	1	8.90	.003**
Current Food Status	1	3.20	.076
Prior Food Status * Current Food Status	1	5.88	.017*
Error	117		

*Note.*  $R^2 = .505$  (Adjusted  $R^2 = .463$ )

\* $p < .05$ , \*\* $p < .01$



In the 2 x 2 ANOVA, all results persisted. There was a significant main effect for prior food status,  $F(1,128) = 12.53, p = .001$ . No main effect was found for current food insecurity,  $F(1,128) = 2.11, p = .149$ . The significant interaction persisted,  $F(1,128) = 5.66, p = .019$ .

### Parental Life Satisfaction and Food Security Status

A 2 x 2 ANCOVA was run to determine if food security status influenced parental life satisfaction. Data is presented in Table 6. No main effects were found, nor any interactions.

Table 6

#### *Parental Life Satisfaction Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	0.03	.857
Education	1	0.51	.479
Income Level	1	1.77	.186
Marriage Status	1	1.40	.239
Age	1	1.28	.261
Sex	1	0.49	.486
Assistance	1	0.22	.637
Prior Food Status	1	0.09	.766
Current Food Status	1	2.09	.151
Prior Food Status * Current Food Status	1	2.91	.091
Error	117		

*Note.*  $R^2 = .176$  (Adjusted  $R^2 = .105$ )

\* $p < .05$ , \*\* $p < .01$

The 2 x 2 ANOVA differed slightly. No significant main effects was found for prior food status,  $F(1,128) = 0.12, p = .732$ . No significant main effect was found for current food status,  $F(1,128) = 3.29, p = .072$ . A significant interaction was found,  $F(1,128) = 4.61, p = .034$ . Of those with no prior food insecurity, participants experiencing current food insecurity had significantly lower life satisfaction than those not currently experiencing food insecurity,  $p = .016$ . Additionally, of those with no current food insecurity, those with prior food insecurity had significantly lower life satisfaction than those without prior food insecurity,  $p = .038$ .

### Parental Happiness and Food Security Status

A 2 x 2 ANCOVA was run to determine if food security status influenced parental happiness. Data is presented in Table 7. No main effects were found, nor any interactions.

Table 7

#### *Parental Happiness Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	0.12	.735
Education	1	0.86	.356
Income Level	1	0.01	.907
Marriage Status	1	1.90	.170
Age	1	0.04	.849
Sex	1	0.75	.389
Assistance	1	0.20	.657
Prior Food Status	1	0.02	.901
Current Food Status	1	2.33	.129
Prior Food Status * Current Food Status	1	2.31	.131
Error	117		

Note.  $R^2 = .131$  (Adjusted  $R^2 = .057$ )

\* $p < .05$ , \*\* $p < .01$

A 2 x 2 ANOVA was run to determine if parental happiness was affected by food security status, either prior or current. No main effect was found for prior food status,  $F(1,128) = 0.03$ ,  $p = .868$ . No main effect was found for current food status,  $F(1,128) = 2.69$ ,  $p = .103$ . A significant interaction was found,  $F(1,128) = 4.49$ ,  $p = .036$ . Of those with no prior food insecurity, participants experiencing current food insecurity had significantly less happiness than those not currently experiencing food insecurity,  $p = .021$ .

### Child Behavior and Food Security Status

A 2 x 2 ANCOVA was run to determine if food security status influenced child behavior. Data is presented in Table 8. A main effect was found for prior food status, by which, children in households who had experienced food-insecure had higher levels of negative behaviors than children in households who had never experienced food insecurity.

Table 8

*Child Behavior Analysis of Covariance Summary*

	<i>df</i>	<i>F</i>	<i>p</i>
Race/Ethnicity	1	0.50	.483
Education	1	0.21	.649
Income Level	1	0.17	.682
Marriage Status	1	0.62	.434
Age	1	2.89	.092
Sex	1	0.01	.922
Assistance	1	0.84	.361
Prior Food Status	1	6.50	.012*
Current Food Status	1	0.03	.858
Prior Food Status * Current Food Status	1	0.45	.503
Error	117		

Note.  $R^2 = .246$  (Adjusted  $R^2 = .181$ )

\* $p < 0.05$ , \*\* $p < 0.01$

A 2 x 2 ANOVA found persistent results. The main effect for prior food status persisted,  $F(1,128) = 10.04$ ,  $p = .002$ . There was no main effect for current food status,  $F(1,128) = 0.13$ ,  $p = .723$ . No significant interaction was found,  $F(1,128) = 0.29$ ,  $p = .589$ .

The Strengths and Difficulties Questionnaire used in this study can be broken up into 5 subscales: emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behaviors. When looking at each subtypes, the child behaviors that appear in food-insecure families appear to be driven specifically by conduct problems,  $F(1,117) = 7.45$ ,  $p = .007$ , and peer problems,  $F(1,128) = 12.32$ ,  $p = .001$ . Both of which were main effects when accounting for the covariates. The 2 x 2 ANOVAs of each subscale can be found in Appendix D.

## Discussion

### Food Security Status and Subjective Well-Being

The first hypothesis of this study was that parents with current experiences of food insecurity would have increased symptoms associated with depression, anxiety, and stress, as well as decreased feelings of life satisfaction and happiness. For individuals currently

experiencing food insecurity, this study found evidence that it significantly increased feelings of anxiety. Like much of the literature before this has found, anxiety is often increased when one is faced with food insecurity (Seifert et al., 2004; Heflin & Ziliak, 2008; Knowles et al., 2016; Martin et al., 2016; Weigel, Armijos, Racines, Cevallos, & Castro, 2016). What appeared curious about these results, however, are that neither stress nor depression appeared to significantly differ among participants' current food status. This is not supported by research, which found that these comorbid experiences were increased by the presence of current food insecurity (Knowles et al., 2016; Martin et al., 2016; Weigel et al., 2016).

Because anxiety is often looked at alongside stress and depression in the literature, future research looking exclusively at people who exhibit symptoms of anxiety but not depression may provide insight into why anxiety could be exclusively affected by current food insecurity. One potential reason why anxiety may have an effect and not depression could be because anxiety has been found to precede depression. Those with depression are likely to also have anxiety, but those with anxiety are not as likely to have depression (Brady & Kendall, 1992). This demonstrates that the comorbidity between variables may be directional, and thus account for anxiety, but not depression, arising during current food insecurity. Another potential reason is simply that adverse life events increase anxiety (Zhaohong, 2015). Thus, current experiences of food insecurity, acting as adverse stressors, may increase anxiety.

Another possible way to look at these results is to consider why stress and depression may not have differed between current food status. One potential reason may be because participants currently experiencing food insecurity were also more likely to get nutritional assistance, which in turn may decrease certain negative feelings (Mabli, Ohls, Dragoset, Castner, & Santos, 2013). If this were true, it would mean that anxiety is not being decreased by these

programs, however, no literature has looked specifically into anxiety. Rather, subjective well-being in general is decreased by food assistance programs (Mabli, et al., 2013; Munger et al., 2016). Finally, the differences between stress, anxiety, and depression may be related to the highly complex nature of subjective well-being. As demonstrated when accounting for covariates in this study, many other factors associated with socioeconomic status influence well-being (Headey & Wearing, 1989). As food insecurity affected stress, anxiety and depression, so did education level, sex, race, and ethnicity.

To further investigate the role of food insecurity on subjective well-being, this study also looked at prior food security. This study supports that prior food insecurity increases negative affect. However, it should be noted that due to the large overlap between those with current and prior experiences of food insecurity, these results may reflect the ongoing presence of food insecurity, rather than the sole experience of prior, but not current food insecurity. In this study, stress, and depression were significantly different between prior food status. Darling et al. (2017) found similar results where depression and stress were significant, but anxiety was not significantly increased by prior food insecurity. It is important to note that both of these studies used the DASS-21 scale, which could mean that these results are related to the way the test is written. If this is not owed to the scale, an additional explanation, though not empirically tested, why anxiety may have been affected by current but not prior food security status could be that anxiety is a short-term, rather than a long-term response to food insecurity. Anxiety may be exhibited more strongly while one transitions and adapts to a lifestyle with food insecurity. This would make sense, as adverse life events increase anxiety (Zhaohong, 2015).

Additionally, the findings that prior food insecurity increases depression and stress are supported by previous literature (Darling et al., 2017). However, other pieces of literature have

found mixed results, such as Siefert et al. (2004), who found that short-term experiences of food insecurity had minimal lasting effects once food security returned. This may once more indicate that the data collected by this study demonstrates the effects of ongoing food insecurity, rather than single episodes. However, these results add to a small subset of literature, which investigates how prior food status may have lasting, lifelong consequences, even if the food security has returned. This study provides evidence to support that prior food status influences depression and stress.

This study also found significant interactions between current and prior food status on stress, depression, life satisfaction and happiness. The interactions that were found can most likely be attributed to the differences between the presence of food insecurity at any point in one's life versus never having had an experience of food insecurity. There were no situations where an interaction was identified that differentiated between having one type of food insecurity, either prior or current, versus having both types of food insecurity. Thus, while these interactions may be generally underpowered, they support that food insecurity of any type increases negative affect.

The major takeaway from the results on this first hypothesis support that ongoing experiences of food insecurity increase negative affect in parents. These results could prompt further research investigating how ongoing experiences of food insecurity differ from single episodes of food insecurity. This study was not able to explicitly parse this information, however the strong overlap of those experiencing current and prior food insecurity would support that ongoing food insecurity increases negative affect, while no evidence was found to support that single episodes of food insecurity increase negative affect.

### **Food Security Status and Child Behavior**

The second hypothesis of this study was that children whose families had experienced food insecurity, either prior or current, would exhibit increased internalized and externalized behaviors. Results from this study reject the null hypothesis, supporting that prior, but not current experiences of food insecurity increase externalized behaviors, primarily peer problems and conduct problems, which remained significant even when accounting for covariables. Emotional problems, which was a subscale on the SDQ and used to measure internalized behaviors, exhibited a main effect that disappeared once controlling for confounds.

These findings support previous literature that food insecurity increases negative behavior (Slack & Yoo, 2005; Whitaker et al., 2006; Slopen et al., 2010; Dunifon & Kowaleski-Jones, 2003). Further, this study supports the early life stress hypothesis proposed by Whitaker et al. (2006) which hypothesized that stress from childhood food insecurity would lead to mental health problems, both immediately and later in life. It also more specifically adds support that social skills decreased for children who have lived in food-insecure households (Jyoti et al., 2005).

Once again, due to the overlap between prior and current food insecurity, these results likely demonstrate that ongoing childhood exposure to food insecurity increases the appearance of externalized behaviors, rather than single experiences.

Another interesting way to look at this data is that prior experiences of food insecurity may not have been experienced during the child's lifetime. While the researcher could not extract the exact time when the family was food insecure, paired with the child's age, it is possible that parents experienced food insecurity prior to the child's birth or during pregnancy. The resulting effects could be related to changes on a biological or epigenetic level. Such

evidence for biological changes has been found in situations of famine during pregnancy, which have led to long-lasting alterations of gene expression in children (Tobi et al. 2009). Future research could be done to investigate the relationship between childhood food insecurity, genetic expression and how this influences behavior.

### **Subjective Well-Being and Nutritional Assistance**

The final hypothesis investigated in this study was that governmental assistance would improve subjective well-being and child behavior. This hypothesis was not supported. There was a significant, positive correlation found between receiving nutritional assistance and feelings of stress, anxiety, and depression, as well as child behavior. Thus, these results potentially demonstrate that food assistance increases depression, anxiety, stress and negative behaviors in children. This could be related to the increased time demands associated with attending appointments for these programs, and the associated needs to obtain transportation, locate child care or take a day off work, though this is not empirically tested. However, assistance did not have a significant effect when accounted for as a covariate. This demonstrates that assistance is not likely increasing negative feelings, but rather that those receiving assistance already have increased negative feelings because of their food insecurity. The same results were found by Heflin and Ziliak (2008), who originally theorized that increases in stress levels among those receiving assistance were related to food insecurity rather than nutritional assistance. Because of the overlap between food insecurity and receiving assistance, getting to the base of this question as to whether programs effectively decrease negative affect is particularly difficult and could account for mixed results (Heflin & Ziliak, 2008; Malbi et al., 2013; Casey et al., 2004).

Another way to potentially interpret these results, while again using caution, is that assistance could explain why not all main effects were found in this study. In this case, receiving



assistance could have helped to improve subjective well-being to a visible degree, by which it could be influencing this model as a whole.

While this study found a variety of results, some matching with previous literature and others not, there is evidence provided through a variety of avenues which would suggest that food insecurity affects behavioral and emotional outcomes in both children and adults. As nearly 1 in 5 people in the United States experience food insecurity, a number which is likely higher when accounting for lifetime occurrence, such results demonstrate a continued need to address food insecurity and hunger. One way this can be done is by enhancing assistance programs, which are already in place. While programs provide physical access to food resources, other barriers, such as lack of transportation and nutritional education may hinder the outcomes of these programs. Further, these programs must ensure that they not only alleviate physical hunger, but address the social, emotional and psychological consequences that accompany food insecurity. Finally, addressing issues generally associated with low socioeconomic status could help eliminate food insecurity, such as increasing access to education for low income families, equalizing wage gaps and paying a fair wage, providing parental support for low income families and ensuring that racial and ethnic minorities have fair and equal access to resources, healthcare and opportunity.

There were several potential limitations to this study, possibly influencing the results. First, due to financial limitations, the sample size was small in this study compared to other studies on this subject. Because of the limited number of individuals who exclusively identified as having either current or prior food insecurity, this study was unable to look at the more immediate consequences of food insecurity nor at how individuals recover following periods of food insecurity. This meant that one major aspect of this research could not be answered without

using underpowered data. Another major limitation is that this study used subjective measures, allowing individuals to self-identify their levels of stress, anxiety, depression, life satisfaction and happiness, as well as their child's behavior. While this is a valuable measure, objective measures, such as clinical diagnoses may have revealed different results, while face-to-face interviews and qualitative data may have also allowed for further insight into individuals' experiences. The final limitation was that this study used the Amazon Mechanical Turk system, which may have influenced the types of people who took the survey and also allows participants to move leisurely through questions, which could have decreased the level of engagement with, and attentiveness towards, the survey.

In the future, two different ways to gather data would be useful. The first, which ideally would have been accomplished by this study, would be to investigate exclusive experiences of prior and current food insecurity, with no overlap, to gain insight into immediate and long-lasting consequences. Further, an investigation of single episodes of food insecurity compared with ongoing experiences of food insecurity would provide insight into short-term and long-lasting consequences. Additionally, because malnutrition can have biological consequences, future studies of the genetic components coupled with food insecurity and subjective well-being would give valuable insight into intergenerational effects of food insecurity. To further answer the question of how assistance programs may help or hinder individuals, a study could collect data on all dependent variables from recipients of these programs, whether it be SNAPs, WIC or otherwise and compare it to data with individuals who are not using assistance but who are eligible for the programs.

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## Appendix A

## Qualtrics Survey

Thank you for your interest in participating in this survey. Please read the whole consent form below and mark "I consent" or "I do not consent" before proceeding.

**Consent to Participate in a Research Study**  
**The College of Wooster**

An investigation of how food security acts on depression, anxiety, stress and child behavior

Principal Investigator: Jena Styka

**Purpose:**

You are being asked to participate in a research study at the College of Wooster. We hope to learn about depression, anxiety, and stress in adults, as well as child behavior.

**Procedure:**

If you decide to participate, you will be asked to answer some questions about food security, feelings of depression, anxiety, and stress, and your children's behaviors. If any question makes you feel uncomfortable, you may skip it. The survey will take approximately 10 minutes to complete.

**Risks:**

Participating in this study might make you aware of feelings of depression, anxiety and/or stress. You may skip any question that you do not feel comfortable answering. If you need help, please contact the National Helpline of the Substance Abuse and Mental Health Administration at 1-800-662-4357, the National Suicide Prevention Hotline at 1-800-273-8255 or seek help from a professional.

**Benefits:**

There are no direct benefits to you for your participation. An indirect benefit is that we learn more about the long-term effects of food security on one's well-being.

**Compensation:**

Participants will receive \$0.65 through the Amazon Mechanical Turk system for their participation.

**Confidentiality:**

Any information you provide will be held confidentially, meaning that your name will not be known, and your information will not be used for purposes outside of this study. When the study is finished, all information will be destroyed.

**Costs:**

There are no costs to you beyond the time and effort to complete the procedure described above.

**Right to Refuse or Withdraw:**

You do not have to participate in this study. If a question makes you uncomfortable, you may skip it. You may change your mind at any time and stop participating in the study. All information will be destroyed.

**Questions:**

If you have any questions, please contact me via email at [jstyka18@wooster.edu](mailto:jstyka18@wooster.edu), or my advisor, Dr. Wilhelms, at [ewilhelms@wooster.edu](mailto:ewilhelms@wooster.edu). **Consent:** By clicking below "I consent," you are demonstrating that you have voluntarily decided to participate in this study, that you have read and understand the information provided above and that you are at least 18 years of age.

- I consent
- I do not consent

End of Block: Consent

---

Start of Block: Screener

We check responses carefully in order to make sure that people have read the instructions for the task and responded carefully. We will only approve participants who demonstrate that they have read and understood the survey. There will be some simple questions that test whether you are reading the instructions. If you get these wrong, you will not be eligible for participation.

- I understand
- I do not understand

Do you have any children under the age of 18 currently living in your household?

- Yes
- No

End of Block: Screener

---

Start of Block: Subjective Well-Being

In general, how satisfied are you with your life?

- Extremely satisfied
- Satisfied
- Slightly satisfied
- Neither satisfied nor dissatisfied
- Slightly dissatisfied
- Dissatisfied
- Extremely dissatisfied

How happy are you in general?

- Extremely happy
- Happy
- Slightly happy
- Neither happy nor unhappy
- Slightly unhappy
- Unhappy
- Extremely unhappy

End of Block: Subjective Well-Being

---

Start of Block: DASS-21

Please read each statement and indicate how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement. If a question makes you uncomfortable, you may skip it.

Never True: Did not apply to me at all

Sometimes True: Applied to me to some degree, or some of the time

Often True: Applied to me to a considerable degree, or a good part of time

Almost Always True: Applied to me very much, or most of the time



	Never True (1)	Sometimes True (2)	Often True (3)	Almost Always True (4)
I found it hard to wind down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was aware of dryness of my mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I couldn't seem to experience any positive feeling at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found it difficult to work up the initiative to do things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tended to over-react to situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I experienced trembling (eg, in the hands)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that I was using a lot of nervous energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was worried about situations in which I might panic and make a fool of myself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that I had nothing to look forward to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found myself getting agitated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found it difficult to relax	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt down-hearted and blue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was intolerant of anything that kept me from getting on with what I was doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I felt I was close to panic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was unable to become enthusiastic about anything	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt I wasn't worth much as a person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that I was rather touchy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt scared without any good reason	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that life was meaningless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: DASS-21

---

Start of Block: Attention Check

Below you are asked to indicate activities that your children participate in on a weekly basis. To demonstrate your attentiveness, please select homework as your only answer below. You may then proceed to the next page, asking further questions about your children's behavior.

Which of the following activities do your children participate in on a weekly basis?

- Reading
- Playing outdoors
- Using Technology (ie, TV, computer, video games)
- Homework
- Sports
- Spending time with friends

End of Block: Check

---

Start of Block: Strengths and Difficulties Questionnaire

For each item, please mark “Not true of any of my children,” “Somewhat true of at least one of my children” or “Certainly true of at least one of my children” when thinking about all children in your household under 18. Please give your answers on the basis of the children’s behavior over the last six months.

	Not true of any of my children (1)	Somewhat true of at least one of my children (2)	Certainly true of at least one of my children (3)
Considerate of other people's feelings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restless, overactive, cannot stay still for long	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often complains of headaches, stomach-aches or sickness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shares readily with other children (treats, toys, pencils etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often loses temper, has temper tantrums or hot tempers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rather solitary, tends to play alone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generally well-behaved or obedient, usually does what adults request	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Many worries, often seems worried	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helpful if someone is hurt, upset or feeling ill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Constantly fidgeting or squirming	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has at least one good friend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often fights with other children or bullies them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Often unhappy, downhearted or tearful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generally liked by other children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easily distracted, concentration wanders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous or clingy in new situations, easily loses confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kind to younger children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often lies or cheats	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often argumentative with adults	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Picked on or bullied by other children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Often volunteers to help others (parents, teachers, other children)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thinks things out before acting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Can be spiteful to others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Steals from home, school or elsewhere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gets on better with adults than with other children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Many fears, easily scared	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sees tasks through to the end, good attention span	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

My children:

	Sex		Age of Child
	Male	Female	
Child 1	<input type="radio"/>	<input type="radio"/>	
Child 2	<input type="radio"/>	<input type="radio"/>	
Child 3	<input type="radio"/>	<input type="radio"/>	
Child 4	<input type="radio"/>	<input type="radio"/>	
Child 5	<input type="radio"/>	<input type="radio"/>	
Child 6	<input type="radio"/>	<input type="radio"/>	

End of Block: Strengths and Difficulties Questionnaire

---

Start of Block: Core Food Security Screener

Please read each statement below and indicate how often this statement has applied to you throughout your life.

I/my family worried whether our food would run out before I/my family got money to buy more.

- Often true
- Sometimes true
- Never true
- I do not know

How long ago was this?

- In the past year
- 1-5 years ago
- 6-10 years ago
- More than 10 years ago

The food I/my family bought just didn't last and I/my family didn't have money to get more.

- Often true
- Sometimes true
- Never true
- I do not know

How long ago was this?

- In the past year
- 1-5 years ago
- 6-10 years ago
- More than 10 years ago

End of Block: Core Food Security Screener

---

Start of Block: USDA Food Security Survey

I/we couldn't afford to eat balanced meals.

- Often true
- Sometimes true
- Never true
- I do not know

How long ago was this?

- In the past year
- 1-5 years ago
- 6-10 years ago
- More than 10 years ago

In the last 12 months, since last December, did you/other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes, almost every month
- Yes, some months but not every month
- Yes, only 1 or 2 months
- No
- I do not know

In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

- Yes
- No
- I do not know

In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- I do not know

End of Block: USDA Food Security Survey

---

Start of Block: Program Participation

People do different things when they are running out of money for food in order to make their food or their food money go further. In the last 12 months, since December of last year, did you ever run short of money and try to make your food or your food money go further?

- Yes
- No
- I do not know

In the past 12 months, since December of last year, did you/anyone in this household get SNAP or food stamp benefits?

- Yes
- No
- I do not know

During the past 30 days, did any children in the household (between 5 and 18 years old) receive free or reduced-cost *lunches* at school?

- Yes
- No
- I do not know



During the past 30 days, did any children in the household (between 5 and 18 years old) receive free or reduced-cost *breakfasts* at school?

- Yes
- No
- I do not know

During the past 30 days, did any children in the household receive free or reduced-cost food at a day-care or Head Start program?

- Yes
- No
- I do not know

During the past 30 days, did any women or children in this household get food through the WIC program?

- Yes
- No
- I do not know

End of Block: Program Participation

---

Start of Block: Robot

Please verify that you are a human being.

End of Block: Robot

---

Start of Block: Demographics

Age:

---

Sex:

- Male
- Female

Race/Ethnicity (check all that apply):

- White
- Hispanic or Latino
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Other

Highest Education Level:

- Less than high school
- High school graduate (or equivalent)
- Some college
- 2-year degree
- 4-year degree
- Professional degree
- Doctorate

## Household Income:

- Less than \$10,000
- \$10,000 - \$19,999
- \$20,000 - \$29,999
- \$30,000 - \$39,999
- \$40,000 - \$49,999
- \$50,000 - \$59,999
- \$60,000 - \$69,999
- \$70,000 - \$79,999
- \$80,000 - \$89,999
- \$90,000 - \$99,999
- \$100,000 - \$149,999
- More than \$150,000

## Marital Status:

- Married
- Widowed
- Divorced
- Separated
- Never married

How many people are currently living in your household?

---

End of Block: Demographics

---

Start of Block: Thank You

Thank you for participating in this survey. Please click the next button to submit the questionnaire and receive your MTurk code.

If you are feeling uncomfortable, distressed or in need of help, there are resources available to you. The National Helpline of the Substance Abuse and Mental Health Administration can be reached at 1-800-662-HELP (4357). The National Suicide Prevention Hotline can be reached at 1-800-273-8255, or you can chat online at <https://suicidepreventionlifeline.org/>. Both resources are available 24/7, 365 days a year.

End of Block: Thank You

---

## Appendix B

## Mean and Standard Deviation Data of Dependent Variables

Table B1

*Means and Standard Deviations of Dependent Variable*

		<u>Parental Life Satisfaction</u>	<u>Parental Happiness</u>	<u>Parental Stress</u>	<u>Parental Anxiety</u>	<u>Parental Depression</u>	<u>Child Behavior</u>
Prior Food Status	Current Food Status	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Prior Food Security	Current Food Security	4.95 (1.03)	4.88 (0.96)	3.91 (4.53)	1.93 (2.59)	1.88 (3.13)	16.11 (5.98)
	Current Food Insecurity	3.60 (1.67)	3.60 (1.14)	8.93 (4.36)	6.80 (4.55)	6.80 (4.87)	17.75 (9.56)
Prior Food Insecurity	Current Food Security	4.10 (0.99)	4.10 (1.20)	10.00 (2.91)	6.70 (4.24)	9.48 (4.15)	22.90 (7.72)
	Current Food Insecurity	4.21 (1.28)	4.26 (1.34)	8.87 (4.41)	7.17 (5.56)	8.29 (5.39)	22.56 (6.12)

## Appendix C

## 2 x 3 ANOVA Data

Presented below are the data from the 2 x 3 ANOVAs conducted on the 2-level prior food status factor (prior food secure, prior food insecure) and the 3-level current food status factor (current, high food insecurity, current moderate/low food insecurity, current food security).

Table C1

*Parental Stress Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	1.66	.200
Current Food Status	2	1.04	.356
Prior Food Status * Current Food Status	2	3.16	.046*
Error	126		

Note.  $R^2 = .262$  (Adjusted  $R^2 = .233$ )

\* $p < .05$ , \*\* $p < .01$

Those with current, low/moderate food insecurity had higher stress scores than those with no current food insecurity and those with current, high food insecurity. Of those with no prior food insecurity, current, low/moderate food insecurity differed significantly from no current food insecurity, but not from current, high food insecurity,  $p = .023$ . Of those with no current food insecurity, those with prior food insecurity differed from those with no prior food insecurity,  $p < .001$ .

Table C2

*Parental Anxiety Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	2.10	.150
Current Food Status	2	2.23	.112
Prior Food Status * Current Food Status	2	1.82	.167
Error	126		

Note. No significant data was found.

$R^2 = .261$  (Adjusted  $R^2 = .232$ )

\* $p < .05$ , \*\* $p < .01$

Table C3

*Parental Depression Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	7.20	.008**
Current Food Status	2	1.45	.239
Prior Food Status * Current Food Status	2	3.76	.026*
Error	126		

Note.  $R^2 = .362$  (Adjusted  $R^2 = .337$ )

\* $p < .05$ , \*\* $p < .01$

Those with current, low/moderate food insecurity had higher depression scores than those with no current food insecurity and those with current, high food insecurity. Of those with no prior food insecurity, current, low/moderate food insecurity differed significantly from no current food insecurity, but not from current, high food insecurity,  $p = .009$ . Of those with no current food insecurity, those with prior food insecurity differed from those with no prior food insecurity,  $p < .001$ .

Table C4

*Child Behavior Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	1.01	.318
Current Food Status	2	2.94	.057
Prior Food Status * Current Food Status	2	2.02	.137
Error	126		

Note. No significant data was found.

$R^2 = .244$  (Adjusted  $R^2 = .214$ )

\* $p < .05$ , \*\* $p < .01$

Table C5

*Parental Life Satisfaction Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	1.14	.288
Current Food Status	2	3.36	.038
Prior Food Status * Current Food Status	2	5.76	.004**
Error	126		

Note.  $R^2 = .156$  (Adjusted  $R^2 = .123$ )

\* $p < .05$ , \*\* $p < .01$

Those with current, low/moderate food insecurity had lower life satisfaction than both those with no current food insecurity and those with current, high food insecurity.

Of those with no prior food insecurity, current, low/moderate food insecurity had significantly lower life satisfaction than no current food insecurity,  $p = .001$ , and those with current low/moderate food insecurity has significantly lower life satisfaction than current, high food insecurity,  $p = .022$ . Additionally, of those with no current food insecurity, those with prior food insecurity had significantly lower life satisfaction than those without prior food insecurity,  $p = .035$ , and of those with current food insecurity, those with prior food insecurity had lower life satisfaction than those with no prior food insecurity,  $p = .026$ .

Table C6

*Parental Happiness Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	0.19	.666
Current Food Status	2	1.35	.262
Prior Food Status * Current Food Status	2	4.37	.015*
Error	126		

Notes.  $R^2 = .134$  (Adjusted  $R^2 = .100$ )

\* $p < .05$ , \*\* $p < .01$

Of those with no prior food insecurity, current low/moderate food insecurity had significantly lower happiness than no current food security,  $p = .007$ . Of those with prior food insecurity, current low/moderate food insecurity had significantly lower happiness than current, high food insecurity,  $p = .029$ . Of those with current food insecurity, prior food insecurity resulted in significantly lower happiness than no prior food insecurity,  $p = .035$ .



## Appendix D

## SDQ Subscale ANOVA Data

The Strengths and Difficulties Questionnaire could be broken up into 5 subscales, allowing for an investigation into specific types of behaviors. The ANOVA data from each subscale is presented below.

Table D1

*Emotional Symptoms Analysis of Variance Summary*

	df	<i>F</i>	<i>p</i>
Prior Food Status	1	5.98	.016*
Current Food Status	1	0.130	.719
Prior Food Status * Current Food Status	1	2.82	.096
Error	128		

*Note.* Prior food insecurity increased emotion symptoms.

$R^2 = .162$  (Adjusted  $R^2 = .142$ )

\* $p < .05$ , \*\* $p < .01$

Table D2

*Conduct Problems Analysis of Variance Summary*

	df	<i>F</i>	<i>p</i>
Prior Food Status	1	11.12	.001**
Current Food Status	1	0.00	.991
Prior Food Status * Current Food Status	1	0.05	.832
Error	128		

*Note.* Prior food insecurity increased conduct problems. This main effect disappeared when accounting for covariables.

$R^2 = .193$  (Adjusted  $R^2 = .174$ )

\* $p < .05$ , \*\* $p < .01$

Table D3

*Hyperactivity Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	2.38	.125
Current Food Status	1	0.10	.753
Prior Food Status * Current Food Status	1	0.09	.766
Error	128		

*Note.* No significant interactions were found.

$R^2 = .065$  (Adjusted  $R^2 = .043$ )

\* $p < .05$ , \*\* $p < .01$

Table D4

*Peer Problems Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	12.32	.001**
Current Food Status	1	0.02	.903
Prior Food Status * Current Food Status	1	1.26	.264
Error	128		

*Note.* Prior food insecurity increased peer problems.

$R^2 = .213$  (Adjusted  $R^2 = .195$ )

\* $p < .05$ , \*\* $p < .01$

Table D5

*Prosocial Behavior Analysis of Variance Summary*

	df	F	p
Prior Food Status	1	2.34	.129
Current Food Status	1	0.01	.915
Prior Food Status * Current Food Status	1	2.20	.141
Error	128		

*Note.* No significant effects were found.

$R^2 = .066$  (Adjusted  $R^2 = .044$ )

\* $p < .05$ , \*\* $p < .01$