The relationship between food insecurity and mental health: Do resilience factors mediate this relationship?

by

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B.S., Southeast Missouri State University, 2021

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF SCIENCE

Department of Applied Human Sciences
College of Health and Human Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2023

Approved by:

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Abstract

Food insecurity continues to rise as a significant public health concern in the United States, affecting millions daily. Literature and studies of food insecurity have identified correlations between food insecurity and mental health; however, understanding to what extent resilience factors mediate this relationship remains lacking among food insecurity literature, specifically among rural populations. This study uses data from the multi-state research project, NC-1171 Interactions of Individual, Family, Community, and Policy Contexts, often referred to as "Rural Families Speak about Health" [RFSH], to better understand the correlation between food insecurity and mental health and the extent to which that relationship's mediation occurs by specific resilience factors of parental alliance, adult physical health status, child behavior, and family routines, among rural, low-income families through the lens of Family Systems Theory (Minuchin, 1974) and Family Stress Theory (Hill, 1958). Data were analyzed using hierarchical multiple regression analysis for 444 rural mothers with low incomes to understand the relationship between variables. Results indicated a significant relationship between food insecurity and maternal mental health. No significance was found to report family routines as a mediating factor. The study findings suggest that parental alliance, adult physical health, and child behaviors are resilience factors that mediate the relationship between food insecurity and maternal depression but can also manifest as risk factors in worsening this relationship among rural, low-income households. The findings and results are of interest to practitioners, policymakers, and researchers and are reported.

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Chapter 1 - Introduction

Food is basic human necessity and right and essential for good health and an active lifestyle. Regardless of circumstance, all individuals are entitled to food for survival. Addressing food insecurity is less of a moral duty or policy solution; rather, it comes down to a legal human rights requirement (United Nations Office of the High Commissioner for Human Rights, 2010). Ayala and Meier (2017) elaborate on this concept by stating,

> "Food insecurity- defined as a 'situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life' – sits firmly at the intersection of the rights to food and health, creating intersectoral opportunities for the implementation of rights-based legislation, policies, and programs for the realization of food security" (Ayala & Meier, 2017).

Despite food representing an inherent human right and a requirement for human survival, food scarcity continues to lead public health concerns and underrecognizing this social determinant of health for numerous years affects millions globally, and challenges continue for many years ahead (Murthy, 2016; Rosegrant & Cline, 2003). When an individual or household lacks adequate food due to limited resources and/or finances, they experience food insecurity (Gundersen & Ziliak, 2015). Beginning a few years after World War II, food security emerged as a comprehensible concern on which researchers began study, focusing primarily on availability of basic food and price stability. Both nationally and globally it evolved to focus on local, household, and individual food insecurity in recent years (Akbari et al., 2022).

Food insecurity represents not an independent occurrence or experience; rather, food insecurity proves complex and multifaceted, which caused an emergence of differing perspectives resulting in inabilities to eliminate food insecurity for all persons (Akbari et al., 2022). Depending on a researchers' or professionals' respective fields, food insecurity researchers used different contextual, individual, and family variables to measure and understand food insecurity. For example, individuals within the nutritional and medical field study food insecurity through the lens of calorie deficiency and nutrition, whereas those in the field of economics and political science often study and measure food insecurity through the lens of food supply and distribution policies, food pricing, and governance (Akbari et al., 2022). Although numerous definitions of food insecurity have emerged, the United States Department of Agriculture (USDA) developed a universally understood and useful definition. USDA defines food insecurity as, "a household-level economic and social condition of limited or uncertain access to adequate food" (Coleman-Jensen et al., 2022a). USDA's definition allows for food insecurity to be understood, examined, and researched resulting in inclusivity of the multi-dimensional factors associated with it.

Historically, food insecurity affected and continues to affect millions of individuals of all ages and backgrounds. Globally, 349 million individuals across 79 countries experienced food insecurity in 2022, which rose from 287 million in 2021 (FAO et al., 2022). Causes of food insecurity include numerous factors which include but remain not limited to the following: poverty, political instability, economic inequalities, natural disasters, population growth, inflation, gender inequality, and poor health (Smith et al., 2000). In addition, the COVID-19 pandemic, the most current and nationally recognized factor, contributed to major causes in rising global food insecurity rates (Food and Agriculture Organization of the United Nations

[FAO] et al., 2022). Worldwide, undernourishment rates rose 1.8 percent between 2019 and 2021, between 702 million and 828 million people suffered from hunger in 2021 which grew by 150 million since the beginning of COVID-19 pandemic (FAO et al., 2022). Even more so, 2.3 billion people, representing 11.7% of the global population, were moderately or severely food insecure in 2021 and 3.1 billion people could not afford healthy foods in 2020 which was 112 million more compared to 2019 (FAO et al., 2022). In addition, FAO et al. (2022) reported that the gender gap among food insecurity is continually growing worldwide as 31.9 percent of women faced moderate or severe food insecurity compared to 27.6 percent of men in the year 2021. If food systems, policies, programs, injustices, and inequalities remain unchanged soon, FAO et al. (2022) projected 670 million individuals, or 8% of the world population, will continue to exist as food insecure in year 2030.

In the United States alone, 10.2 percent of households (13.5 million households; 34 million individuals) experienced food insecurity to some degree in 2021 (Coleman-Jensen et al., 2022c; NIHCM, 2022). In 2021, 53 million individuals relied on food banks and community programs to provide adequate food for their households (NIHCM, 2022). During 2022, inflation rates have impacted the U.S. economy, drastically increasing food prices, specifically healthy and nutrient-dense food, negatively impacting many individuals' food security rate (NIHCM, 2022). Between years 2021 and 2022, food prices have risen 11.4 percent, and increased the prices for eggs (39.8%), milk (17.0%), bread (16.2%), chicken 16.6%), and fruits and vegetables (9.4%) (NIHCM, 2022). Food prices drastically rising in the past year not only creates even more difficulty for already food-insecure households obtaining adequate and nutritious foods, but also will create higher rates of food insecurity among households in future years (Martincheck, 2022).

As research studies indicate, food insecurity rates and unfavorable health outcomes derived from food insecurity continue to rise yearly (FAO et al., 2022; Coleman-Jensen et al., 2022b). Globally, rates of undernourishment, developmental delays among children, anemia among women aged 15-49, inability to purchase food for a healthy and nutritious diet, and overall rates of food insecurity continued to rise since 2019 (FAO et al., 2022). The U.S. made progress in reducing food insecurity rates among households with children, married couples with children, single mothers with children, households with Black and/or non-Hispanic adult members, all low-income households, and households in the South (Coleman-Jensen et al., 2022b). Although strides made for few subpopulations reduced food insecurity, much work must occur globally and nationally to decrease overall food insecurity rates. Due to rising food insecurity and its accompanying negative outcomes, policies aimed to reduce barriers of experiencing hunger, food insecurity, and malnutrition no longer appear effective and thus require reformation (FAO et al., 2022).

Individuals with low income and those who reside within rural areas continue to be more susceptible to food insecurity and its impacts than individuals with higher income and residing within urban areas (Coleman-Jensen et al., 2014). In 2021, rural populations comprised 14 percent (46 million), of the U.S. population (Davis et al., 2022). The U.S. Department of Agriculture reported 10.8 percent of rural areas, compared to 8.8 percent in urban areas, experienced food insecurity to some degree in year 2021 (Coleman-Jensen et al., 2022b). Rural areas suffer more from the lack of available resources and lower incomes compared to urban communities, which limits rural residents in accessing and consuming healthy foods, creating higher rates of food insecurity and health outcomes (Food Research & Action Center, 2018).

Food insecurity produces multiple consequences on various levels. Inadequate amounts of food, along with lack of access to nutrient dense foods, affects health, well-being, and quality of life for any given person (Pathak et al., 2022). Research indicates that food insecurity is associated with negative effects on mental health status of those suffering from food insufficiency, for example, food insecurity documentation exists linking it to increased risk for multiple chronic health conditions such as diabetes, obesity, heart disease, and various mental health disorders (Gundersen & Ziliak, 2015; NIH, 2022). Food insecurity for children continually results in associations with depression, cognitive problems, impaired academic performance, impaired social skills, hyperactivity and/or inattention, and anxiety (Shim & Compton, 2020; NIHCM, 2022). Among adults, food insecurity's association with depression remains well known (NIHCM, 2022). Food insecurity has been found has been linked to maternal depression as well as negative child health outcomes (e.g., anxiety, depression, psychosocial dysfunction, and difficulties interacting with peers) (Nagata et al., 2019). Researchers found worsened mental health and psychosocial stressors across multiple regions after controlling for demographic and socioeconomic variables associated with food insecurity (Pourmotabbed et al., 2020).

Consistent and strenuous individual, economic and environmental exposures, food security, lack of access to resources, health-related behaviors, and community related disparities burden rural communities (Braun, 2008; Long et al., 2018). Compared to the general population, rural, low-income families, specifically rural low-income mothers, and their children, identify as the most food insecure (Olson et al., 2004; Mammen & Sano, 2018). Challenges and disparities relevant to rural areas disrupt families and individual's pathways to living a long, fulfilled, and happy lifestyle (Bauer & Katras, 2007). Rural populations historically incorporated higher rates

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of food insecurity than urban counterparts due to multiple factors such as limited supermarkets, lower educational attainment, limited availability of food items, and higher food item costs (Olson et al., 2004). Previous researchers identified individual skills such as ability to managing and budgeting household income, and knowledge on how to access resources, in alleviating food insecurity among rural families (Olson et al., 2004).

Resilience and Food Insecurity

Resilience refers to how well an individual or family unit positively adapts to any given event, stressor, or crisis that threatens the ability to function (Cutuli et al., 2021). Embedding risk and protective factors inherently within the concept of resilience serves as a useful guide; for example, an individual uses available internal and external resources (protective factors) to overcome adversity (risk factors) (NBHC, 2020). Resilience sources emerge from personal/individual, biological, environmental, or a combination of some or all three factors (Herrman et al., 2011). For the purposes of this paper, resilience focuses on individual and household level factors. Individual and household factors may include, but are not limited to, self-efficacy, self-esteem, family togetherness, cognitive appraisal, optimism, and agreeableness (Hermann et al., 2011). Resources an individual inherently holds within themselves define their resilience in the face of adversity; therefore, it is important to note that resilience independently cannot make life easier nor remove the challenge. Rather, resilience better equips individuals with strengths and resources (e.g., coping skills, perception of event, self-efficacy, etc.) to understand adversity's unavoidable nature and gives power to working through and eventually overcoming the challenge (Fleming et al., 2018).

Scant research focuses independently on the mental health effects arising during food insecurity experiences in rural families and work continually focuses on the physical short- and

long-term health effects and mental health illnesses emerging due to the lack of nutrition and accompanying lower physical functioning (Jones, 2017). Research literature also lacks exploration and explanation regarding resilience among rural populations facing food insecurity and mental health illnesses. This study aims to identify specific resilience factors that mediate the relationship between food insecurity and maternal mental health among rural, low-income households. This study applies Family Systems Theory (Minuchin, 1974) and Family Stress Theory (Hill, 1958) to better understand and explain how resilience factors, specific to rural households, mediated food insecurity and maternal depression and thus considered in association with producing better maternal mental health outcomes. Further, considering food insecurity within the context of Family Systems Theory (Minuchin, 1974), allows for a more holistic approach to addressing the issue regarding prevention and intervention, considering the needs and experiences of all family members as an entire unit. Understanding food insecurity through the ABC-X theoretical model (Hill, 1958) can help guide policymakers and health practitioners gain a deeper understanding of the underlying causes and develop evidence-based interventions that address the root causes of food insecurity.

Chapter 2 - Review of Literature

Because of the importance of guiding theories in designing the study and interpreting results, presenting them first provides a useful foundation for understanding the rationale for this work. After presenting these theories, a comprehensive literature review follows and provides an understanding of the current body of research knowledge. Finally, these sections contribute to the explanation of how this study addresses gaps identified in the literature and where this study's variables fit within the applied theoretical frameworks.

Theoretical Framework

Minuchin's (1974) Family Systems Theory, specifically focusing on his structural family therapy model drawn from systems theory, is a theoretical framework which explains family functioning through the lens of ecological interpretation to better understand the influence of internal and external factors on family stress. Minuchin's (1974) model emphasizes the importance of understanding families and their related stress by examining the interrelations of the family system as one, rather than focusing solely on individual family members, to grasp family members interactions, transactions, and the interaction of the family system within a larger social ecology (Minuchin, 1974; Pardeck, 1989). In other words, Minuchin's (1974) model is based on assumptions that an individual family member's problems were not so much individual-based but rather a function and result from observations over a period of the larger family system or unit (Watson, 2012).

Family Systems Theory views the family as a social structure in which multiple subsystems exists; in other words, if the family unit faces stress from internal or external sources, the family must adapt to such stressors, or pressures, and in turn, may create dysfunction within the family unit (Kassop, 1987). In the occurrence of a stressor event, Family Systems Theory

(1974) considers how all family members respond to said event, and disordered function regarding a family system's boundaries, hierarchies, and cross-generational alliances (Minuchin, 1974; Watson, 2012). Minuchin's (1974) theoretical model explains that organized and high functioning families will exemplify characteristics of maintaining clear boundaries among family members, exhibit consistent and predictable interactions, and have a strong sense of connectedness (Minuchin, 1974; Watson, 2012).

Minuchin and Montalvo (1967) expanded on this previous model to specifically adapt the theoretical framework to families of low socioeconomic status (SES). Low SES families present differential features compared to families with middle and high SES (Minuchin & Montalvo, 1967). Different features of low SES families exist within unpredictable and ever-changing relationships between family subsystems, work through situations independently rather than working as a uniformed family unit and exhibit disorganized behaviors in the presence of change or stressful events (Minuchin & Montalvo, 1967). Family Systems Theory (Minuchin & Montalvo, 1967) illustrates that in effective intervention among low SES families, teaching through such families through visualized actions, such as role-play, proves to be more constructive and successful in promoting change rather than educating through verbal teaching strategies such as simply talking through scenarios.

Imperative to the theoretical framework, is the concept that social and economic-level factors, such as low-income or food insecurity, cannot be eliminated through programs interventions and therefore, intervening to change family and individual level factors will be most effective and inherently reduce negative outcomes to the social and economic-level factors (Minuchin, 1974; Minuchin & Montalvo, 1966). Through Family Systems Theory, this study will be able to better understand and identify individual and household level factors that mediate

rural, low-income household's experiences of food insecurity and mental health outcomes and potentially provide substantial recommendations for future practice and policies.

Another theoretical framework that accounts for cumulative stressors (e.g., differing degrees and severity of food insecurity, duration of food insecurity and mental health, unemployment, lack of resources) and coping among families is the ABC-X model, developed by Reuben Hill (1958). Hill's (1958) ABC-X model is used to understand how families experience and undergo stressful events and how the family responds to the event either resulting in a resilient outcome or proceeds into a crisis period (Hill, 1958). An important factor embedded in the ABC-X model is the concept on family equilibrium; in explanation, a family unit must sustain stability and obtain adequate resources to all members within the family unit to uphold proper functioning and positive outcomes to stressors (Rosino, 2016). However, not every sudden event and/or stressor leads a family into crisis; in explanation, if a family has little to no available resources and cannot define or view the event as one that is able to be overcome, then a crisis will occur but if the family is able to maintain their balance and recover to stability quickly, then a crisis is unlikely to occur (Hill, 1958). The interactions between readily available resources and the family's definition of event determine the extent, duration, and range of crisis (X) experienced by family units. Families with adequate resources and perceptions may experience little to no crisis whereas families without readily available resources and negative perceptions will likely experience prolonged and higher rates of crisis (Rosino, 2016). Variable factors embedded within the ABC-X model are explained and described below.

The variables in the ABC-X model include (A) the stressor or adverse event, (B) the internal and external resources available to the family, (C) the family's given perception assigned to the event, and (x) the overall outcome or degree to which the family the stressor creates family

dysfunction where the family is unable to maintain equilibrium and function (Hill, 1958; Rosino, 2016). In other words, the stressor or event (A) interacts with the family's available resources (B) as well as with the definition the family gives to the event or stressor (C) which produces the crisis (X). Hill (1958) defines the stressor or event (A) as any sudden occurrence which the family was unprepared to endure and places high demand on the family unit and must be viewed as problematic. Stressor events present differently from family to family which may not always be an adverse event but one the family views as causing imbalance among members where dysfunction of roles and boundaries is present among family members (Hill, 1958). Stressors or events may include, but not limited to, sudden employment of a parent/caregiver, health challenges, housing instability, and relationships changes such as divorce or separation of parents/caregivers.

For this paper, food insecurity will be used as the stressor event. Multifaceted resources readily available to the family (B) may be internal or external which lead the family to avoid crisis or into crisis if resources are unavailable (Hill, 1958). Internal resources may include knowledge of coping skills, self-esteem, communication, problem-solving skills, successful adaptation to previous stressful events/occurrences, family integration, and mutual adaptability (Rosino, 2016). External resources might include adequate household income, household assets, and access to community resources (Rosino, 2016). The definition a family gives to the event (C) is a defining factor of leading the family into a crisis or not. In explanation, Hill (1985) explained if a family defines and interprets the event as a crisis, they will more likely experience crisis whereas families who do not define the event as a crisis are more likely to have a positive outcome, not experiencing a crisis (Hill, 1985). Further, families who view the event as negative are more likely to experience crisis as stress and negative mental health will continually rise and

become worsened for family members making the event harder to overcome as family well-being and functioning id decreased (Rosino, 2016). The model proposes that there are multiple pathways to successfully navigating a crisis in which the pathways are dependent on internal (e.g., family's resources) and external (e.g., coping mechanisms) factors (Ballard et al., 2020). The present study will use the ABC-X model as a theoretical framework to investigate the associations between food insecurity, mental health, and resilience in rural, low-income mothers and their households. In the present study, (A) refers to household food insecurity, (B) refers to resources shown to alleviate negative outcomes experienced from food insecurity and mental health, (C) refers to rural household's perceptions of resources described in (B), and (X) refers to the degree of and how the crisis of mental health was experienced.

Through Family Stress Theory, food insecurity can be better understood as a family stressor event due to larger issues within the family system. For example, food insecurity experienced by a whole family system may be resulted from lack of resources, limited availability and access to healthy and nutritional food choices, housing costs, low-income, or even marital hardship that affects the ability of the family to provide adequate food and nourishment to all members (Mammen et al., 2009). Family Stress Theory in relation to food insecurity, means that one family member's lack of access to adequate and nutritious food may impact the health and well-being of the entire family unit. Even more, the stress and strain of food insecurity may also affect family dynamics and relationships, leading to further negative consequences. As a household experiences food insecurity, imperative decision-making is inherently present; for example, food insecure households face decisions such as deciding whether to put funds towards food, housing, utilities, healthcare, how to manage costs, or how to ration food among family members (Alinovi et al., 2010; Greder et al., 2017). Such decisions

mentioned are seemingly dreadful and difficult for families to make and if families facing food insecurity along with multiple other stressors and lack of coping mechanisms and resources, crisis or chronic stress will likely put families in considerable dysfunction and significant mental health illness (Greder et al., 2017). Utilizing both Family Systems Theory (1974) and Family Stress Theory (1958) will help determine the extent of the relationship between food insecurity and mental health and will be a guide to determine if resilience factors (e.g., adult health, parental alliance, family routines, life skills and knowledge of community resources) kept households under study astray from experiencing crisis and/or significant dysfunction.

Food Insecurity

Food insecurity, as defined by the United States Department of Agriculture (USDA), is experienced when "the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (Coleman-Jensen et al., 2022d). Millions of U.S. residents face food insecurity, which continues to increase due to its prevalence and numerous negative impacts (Gundersen et al., 2011). Researchers have heavily focused on four main dimensions of food insecurity: *availability, access, utilization*, and *stability* (Maxwell & Smith, 1992; Upton et al., 2016). Food availability refers to one's ability to access food from either their own growing methods or from a supermarket, accessibility refers to all members within a household living with adequate food or meals at any given time to maintain a nutritional diet, utilization refers to the ability of an individual to appropriately digest food nutrients and the knowledge one has to make sound judgements in buying healthy food, and stability refers to the time in which individuals experience food insecurity (Simelane & Worth, 2020).

Range and Severity of Food Insecurity

Food insecurity presents a complex phenomenon which occurs in different degrees and levels of severity. To better capture nuances of severity of food security, USDA defines and uses four levels of severity: *high food security, marginal food security, low food security*, and *very low food security* (Coleman-Jensen et al., 2022a). High food security refers to a household without reports or indications of food-access problems, limitations to food access, and no anxiety surrounding food (Coleman-Jensen et al., 2022a; Coleman-Jensen et al., 2022d). A food secure household must mean readily available access to adequate and safe foods, and assured ability to acquire food in a socially accepted manner (Coleman-Jensen et al., 2022d). Marginal food security refers to one or two reported indications of experiencing anxiety or stress over food quantity without changes of diet or food intake for any member residing in a household (Coleman-Jensen et al., 2022a). Low food security refers to reports of reduced quality, variety, and/or diet desirability without reducing and disrupting quantity and eating patterns (Coleman-Jensen et al., 2022d). Very low food security refers to reports of multiple indications of disrupted eating patterns and reduced food intake (Coleman-Jensen et al, 2022a). For an individual or household considered in the very low food secure level, food intake of household members requires reduction, and normal eating patterns were disrupted due to lack of money and other resources to obtain enough food (Coleman-Jensen et al., 2022a). Households with high and marginal food security account for the food secure category, whereas households with low and very low food security account for the food insecure category (Staren, 2020). The duration and severity of food insecurity is dependent on number of risk factors (e.g., median income, employment, health status, race/ethnicity, housing stability, etc.) present and readily available resources to alleviate food insecurity (Office of Disease Prevention and Health Promotion, n.d.).

Determinants of Food Insecurity

Predictors and causes of food insecurity are complicated and multidimensional in which occur at the individual, community, and environmental levels and often correlate with poverty, social and economic disadvantage, individual attributes, and political and social environments (Ashby et al., 2016; Staren, 2020; Lee & Frongillo, 2001). Households led by an African American, Hispanic, divorced or separated person, younger-aged person, individuals holding lower attained educational degrees, households with children, and individuals who never married are more likely to experience food insecurity than their counterparts (Gundersen et al., 2011).

Although food insecurity has potential to impact any given person or population, certain subpopulations often experience food insecurity at higher rates. Therefore, they are more vulnerable to experience food insecurity at any given time (Coleman-Jensen et al., 2022b). In 2021, rates of food insecurity within the U.S. were significantly higher compared to the national average (10.2 percent) for the following: households with children (12.5 percent); households with children under 6-years of age (12.9 percent); households with children who were led by a single female (24.3 percent) or a single male (16.2 percent); women living alone (13.2 percent), men living alone (12.3 percent); households owned by Black, non-Hispanic (19.8 percent) and Hispanic (16.2 percent) individuals; and households with incomes below 185 percent of the poverty threshold (26.5 percent) (Coleman-Jensen et al., 2022b). More specifically, in 2021, 7.0% of White, 16.2% of Hispanic, and 19.8% of Black individuals endured food insecurity (NIHCM, 2022).

Inherently intertwined with existing determinants of food insecurity (e.g., job opportunities, poverty, less available and accessible resources, etc.) are the racial and ethnic disparities documented to exist in the context of food insecurity (Odoms-Young, 2018; Office of

Disease Prevention and Health Promotion, n.d.). Intersectionality of race, ethnicity, and other social and economic determinants of food insecurity greatly contribute to higher risk of exposure to food insecurity and accompanying health complications as well as to higher rates of food insecurity among marginalized groups (Nam et al., 2015; Odoms-Young, 2018). Numerous studies and literature report Hispanic and Black individuals and households are at greater risk for experiencing food insecurity than White individuals (Myers & Painter, 2017; Nam et al., 2015; Odoms-Young, 2018; Office of Disease Prevention and Health Promotion, n.d.).

A lack of resources and money often cause food insecurity (Coleman-Jensen et al., 2022b; Gundersen & Ziliak, 2015). Prevalence of food insecurity depends on multiple contextual effects and processes (e.g., household-level, community-level, and state-level characteristics) (Coleman-Jensen et al., 2022b). Average wages, housing costs, unemployment rates, number of and access to resources, and food assistance programs represent considerable state-level characteristics affecting food insecurity prevalence (Coleman-Jensen et al., 2022b). As previously mentioned, causes of food insecurity include seemingly complex and unlimited factors, however, a few major leading causes to experiencing food insecurity include poverty, unemployment, lack of affordable housing, having a chronic condition or disability, lack of access to health care, and systemic racism and racial discrimination (NIHCM, 2022).

Food Insecurity and Mental Health

Shim and Compton (2020), define determinants of mental health which include, but is not limited to, discrimination and social exclusion, adverse childhood experiences (ACEs), low educational attainment, poor education quality, educational inequality, poverty, income inequality, neighborhood deprivation, food insecurity, unemployment, underemployments, job security, poor housing quality, housing instability, climate change, adverse features of

environment, and poor access to health care. Such determinants of mental health lend themselves to increased risk factors for mental health illness and substance use disorders which in turn, contribute to premature mortality for individuals facing significant mental illnesses (Shim & Compton, 2020).

Individuals who experience food insecurity are at greater risk of experiencing mental health effects compared to food secure persons in which researchers have found food insecurity to be associated with worsened mental health and psychosocial stressors across multiple regions (Pourmotabbed et al., 2020; Pryor et al., 2016). In specific, studies found that food insecurity is associated with major depressive disorder, suicidal ideation, substance use problems, higher rates of perceived stress, and increased feelings of worry (Pryor et al., 2016; Wolfson et al., 2021). Conversely, individuals who suffer from long-term mental illness are more likely to experience food insecurity in latter following the diagnosis (Bruening et al., 2017). In children, food insecurity is associated with depression, cognitive problems, and anxiety. Among adults, food insecurity is associated with depression and poor sleep problems (NIHCM, 2022).

Food insecurity has been identified in association with mental health disorders and behavioral problems in younger-aged children due to accumulated stress, anxiety, and feelings of shame experienced with food insecurity (Burke et al., 2016). In fact, one study found household food insecurity was significantly related to worsened general health, lower rates of health care access, higher rates of depressive symptoms, and prominent rates of emergency department use (Thomas et al., 2019). Children who experience household food insecurity, regardless of range or severity level, have potential to experience behavioral, developmental, and academic disruptions (Shanker et al., 2017). Researchers found that households with mothers experiencing depression were twice as likely to experience food insecurity and individuals who have experienced mental

illness for two consecutive years, specifically depression, have significantly higher chances of experiencing persistent food insecurity rather than periodic, short-term food insecurity experiences (Hernandez et al., 2013; Hanson & Olsen, 2012).

Mental Health Outcomes from Food Insecurity

Food insecurity promotes higher risks of depression, stress, anxiety, and other psychological disorders (Pourmotabbed et al., 2020). Furthermore, food insecurity alone may promote anxiety and stress, leading to long-term mental health illness diagnosis (Myers, 2021). For example, an individual suffering from any degree or level of food insecurity may experience feelings of alienation, deprivation or restrictions among food choice, and anxiety about food adequacy which negatively influence the development of mental health disorder(s) (Myers, 2021). Most alarming, Fang et al. (2021) found that food insecurity is associated with a 257 percent higher risk of anxiety and a 253 percent higher risk of depression.

Defining Rurality

Many individuals associate farmlands, lack of business establishments, small population, and the countryside with the term *rurality*. Throughout many years, debates raged about the definition; in turn, this caused hardship in identifying solutions to challenges faced among rural populations due to differing definitions and the inability to clearly identify what constitutes a rural area (Leight, 2003). Depending on the source and context, defining rurality occurred using different language, application, and usage. Within the United States, rural areas differ regarding landscape, demographics, size, etc., making it difficult to define rural regions using one singular definition (Leight, 2003).

Rurality may find definition in terms of population density, geographical isolation, or metropolitan-nonmetropolitan classification, in which the definition's usage depends on the

purpose of utilization of the term (Cromartie, 2019). Murray and Keller (1991) indicated the definition of rural most often references population density. The U.S. Census Bureau defines rural in context of urban area populations; in explanation, after dividing urban areas, census tracts or blocks with 50,000 or more residents, and urban clusters, tracts, or blocks with at least 2,500 but less than 50,000 residents, the remaining areas are considered rural (Bennett et al., 2019; Ratcliffe et al., 2016). The Office of Management and Budget (OMB) defines rurality by utilizing the U.S. Census definition of rural along per Metropolitan Statistical Areas, a city with a population of at least 50,000 or an urban area with 50,000 or more residents that is part of a county or several counties with a population of no less than 100,000 residents (Bennett et al., 2019; Leight, 2003).

Challenges Unique to Rural Populations

Rural populations are burdened with seemingly unique and difficult barriers compared to urban areas (Olson et al., 2004). In 2021, 14% of the U.S. population comprised all rural areas (Dobis et al., 2021). Rural communities are often susceptible to adversity because of economic circumstances, natural disasters, and adjustments among demographic composition of residents over time (Fleming et al., 2018). Individuals living within rural areas often face higher rates of poverty, unemployment and underemployment, limited supermarket options, lack of transportation, and have lower rates of medical insurance (Curtin & Cohn, 2015; Mohatt et al., 2005; Olson et al., 2004). Health challenges, such as lack of health care professionals and lack of health care, among rural areas has been highly researched, studied, and examined since year 1970 to current time due to alarming higher rates in rural populations compared to other geographical locations (Leight, 2003; Mammen & Sano, 2018; Smalley et al., 2010).

Food Insecurity Among Rural Populations

Food insecurity refers to the inability to afford or appropriately access nutritionally sufficient and safe food to live an active, healthy lifestyle and does not occur independently; often, if an individual or household is experiencing food insecurity, other factors, or stressors, such as low income, no social support, limited access to resources, etc. are also present, specifically among rural areas (Lee & Frongillo, 2001; Nagata et al., 2021). Compared to urban or suburban areas, rural regions have distinctive attributes contributing to higher rates of food insecurity (Olson et al., 2004). A few factors, specific to rural areas, contributing to higher rates of food insecurity may include limited grocery store options, limited availability of food commodities, higher costs of food items, limited options for healthy and nutritious foods, etc. (Olson et al., 2004). In addition, lack of transportation has been documented as a contributing factor to high rates of food insecurity among rural communities contributing to isolation furthering the inability to access food (Bauer & Katras, 2007).

Rates of food insecurity are significantly higher and more persistent among rural areas compared to urban counterparts (Mammen et al., 2009). Rural residents, specifically low-income single mothers, have greater disadvantage and are more likely to endure hardships such as unemployment, low education levels, and lower wages (Mammen et al., 2009). FAO et al. (2022) reported that rural mothers with little formal educational background are more vulnerable to developing anemia and other negative health conditions. In addition, children living in rural communities are more vulnerable than urban residing children to stunting (children being too short for their respective age), which impacts their overall development and increases the risk of contracting chronic infections and diseases, and child wasting (a life-threating condition produced from deficient nutrient intake and absorption) (FAO et al., 2022).

One study conducted upon rural, low-income residents found Supplemental Nutrition Assistance Program (SNAP) participants were twice as likely to report higher rates of experiencing food insecurity compared to counterparts not receiving SNAP benefits but still reported as low household income (DeWitt et al., 2020). In addition, SNAP participation is higher among rural communities (16%) compared to urban areas (13%) however, food insecurity rates continually remain higher in rural communities despite higher SNAP participation rates (DeWitt et al., 2020). This revelation suggests that SNAP alone seems unable to alleviate food insecurity and focus on individual- and community-level factors greatly contribute to higher food insecurity among rural populations (DeWitt et al., 2020).

Mental Health Among Rural Populations

Depression, substance abuse, domestic violence, and child abuse show higher rates within rural populations when compared to urban populations (Smalley et al., 2010). Specific to women, rates of depression run higher in rural residents than urban residents due to lack of insurance, underinsured health insurance, and lack of access to professional and culturally appropriate mental health care (Downey & Greder, 2014). In addition, isolation has also been found to contribute to higher rates of depression among rural residing residents (Downey & Greder, 2014). Along with these factors, racial inequities play a role in equal access to resources but are more prevalent and noticeable among rural populations as underutilization of mental health services and reduced acceptability of services are more prevalent among racially marginalized rural residents (Downey & Greder, 2014). Low-income mothers in rural communities face higher rates of mental health illness which may largely be due to lack of education, training, limited opportunities within the environment, work-family conflicts (e.g.,

working undesirable jobs with lower wages and few to no benefits), and irregular employment patterns (Sano et al., 2014).

Resilience Among Rural Populations

Research has documented various, multi-level risk factors correlated to rural communities (e.g., lack of adequate health care professionals, inadequate access to quality health care, limited employment opportunities, lower median household income, food insecurity, and lack of transportation) which contribute to family instability, worsened health, and overall well-being (Bolin et al., 2015; Mammen et al., 2018; Cancel-Tirado et al., 2018). However, despite multiple contextual risk factors, rural communities possess resilience, or protective, factors that alleviate, or at least mitigate, the consequences of such risks (Olson et al., 2004; Cancel-Tirado et al., 2018). Consistent throughout the research literature, studies of the strongest protective factors among families and communities in rural areas reveal the strong, quality relationships among community members, high value held to relationships, and individual and community pride (Fleming et al., 2018).

Researchers further identified protective factors such as prioritizing interpersonal relationships (e.g., parent-child relationship), engaging in activities with adults, and obtaining relationships with peers promote healthy child development, specifically for low-income children (Austin et al., 2020). Support among rural families has been identified as a key contributor for alleviating negative outcomes from stressful situations or events (Ontai et al., 2008). Support between parents or caregivers in rural households in association with strong parental confidence serves as a protective factor among family coping to stressful experiences (Ontai et al., 2008). Research literature proves deficient in determining the effects of strong parental alliance as mediating food insecurity and maternal mental health in rural households.

This study will examine if parental alliance served as a mediating protective factor for rural households experiencing food insecurity and maternal depression.

Research indicates household food insecurity's association with lower rates of adequate physical and mental health among adults (Stuff et al., 2004). Food insecurity studies and literature focus on the relationship between food insecurity negatively affecting physical health status and the outcomes that may arise from this relationship in future years (Gundersen & Ziliak, 2015). Literature lacks support for identifying how adequate physical health among adults mediates food insecurity and maternal mental health symptomology, specifically regarding rural households. Therefore, this study adds to the food insecurity literature by examining the extent to which adult health serves as a protective factor for food-insecure households and related maternal mental health experience. Guided by Family Stress Theory (Hill, 1958), identifying adequate adult physical health and strong parental alliance as a mediating factors among food insecurity experiences and maternal depressive symptom outcomes for rural, low-income households has potential to identify if proper adult physical health poses as an internal coping mechanism and alludes to positive household meaning making of such events, leading the family into successful adaptation and out of experiencing a crisis or severe family dysfunction.

Consistent family routines, rituals, and traditions have been noted to provide family functional structure and stability among family units (Manczak et al., 2017). Inherently embedded in family traditions, predictable family behavior and consistency among family planning represent identified protective factors fostering better outcomes among food insecure households (Fiese et al., 2016). Effective family planning and predictable family behaviors possess potential to mediate relationships between food insecurity and maternal mental health (Fiese et al., 2016), however, researchers must pay attention to successfully identifying family

routines as mediating protective factors regarding food insecurity and mental health in rural households. Therefore, this association will be examined in the present study. Examining family routines as a mediating resilience factor in determining the outcome of rural, low-income households' experiences of food insecurity and maternal depression outcomes was included due to previous literature findings as well as theoretical frameworks guiding this study (Hill, 1958; Minuchin, 1974). Through Family Stress Theory (Hill, 1958), identifying family routines as a mediating factor among experiencing food insecurity and maternal depression for rural, low-income households, will potentially further and explain the idea and concepts that if a household is to have strong family routines, lower levels of stress and strain regarding the overall experiences as well as the decision-making factor inherent to food insecurity (Alinovi et al., 2010; Greder et al., 2017), successful family adaptation will be noticeable and lower levels of food insecurity and maternal depressive symptomology will be present.

A review of the extant literature indicates that no studies examining child behavior presenting a mediating protective factor for maternal mental health and food insecurity, or any stressful event/situation for that matter on in rural, low-income families exists. Child behavior has been examined most often as a risk factor regarding parental mental health. This study will add to food insecurity literature by examining the extent to which child behavior mediates food insecurity and maternal mental health outcomes.

Summary

Food insecurity, mental health, and multiple stressors such as lack of adequate health care and transportation, disproportionately contribute to greater vulnerability among rural, low-income households (Dyk et al., 2018). Although many risk factors add to the vulnerability present in rural populations, protective factors such as a strong sense of community, are

inherently important as they help mediate negative outcomes for rural residents (Fleming et al., 2018). Specific to rural areas, local food environments, social relationships, and knowledge of available resources are necessary to support rural residents' quality of life (Garasky et al., 2008). For this study, individual and household protective factors of parental alliance, family routines, child behavior, and adult physical health status will be examined to determine if such factors aid in mediating the relationship between food insecurity and maternal mental health for rural households.

The Present Study

Recall that FAO et al. (2022) reported that the gender gap among food insecurity is continually growing worldwide as 31.9 percent of women faced moderate or severe food insecurity compared to 27.6 percent of men in the year 2021. However, few studies focus independently on the mental health effects, specifically maternal depressive symptomology, arising during food insecurity experiences of women, rather they focus on the physical short- and long-term health effects and mental health illness that emerges due to lack of nutrition and lower physical functioning (Jones, 2017). Because food insecurity proves multidimensional and difficultly eradicated, understanding the relationships between food insecurity, maternal depressive symptoms, and resilience factors mediating negative outcomes is of great importance for health professionals, researchers, policy makers, and program developers to effectively target and prevent negative outcomes derived from food insecurity. Although the associations between mental health, risk and protective factors, and food insecurity remain highly researched and documented, little knowledge exists about how resilience factors mediate the relationship and experience of food insecurity and maternal depression outcomes. The present study aims to fill these gaps through the following research questions:

RQ1: To what extent does food insecurity relate to depression among rural, low-income mothers?

RQ2: To what extent does the relationship between food insecurity and depression in these mothers result in mediation by theory-driven resilience factors (e.g., child behavior, adult health, parental alliance, family routines)?

This study aims to add to the food insecurity literature by examining relationships between maternal depression, adverse child behaviors, and food insecurity among rural, low-income mothers and their respective households to increase the understanding of the extent to which various resilience factors at work in rural households support alleviating food insecurity and negative maternal depression and child behavioral outcomes.

Hypotheses

H1: Food insecurity will have a significant positive relationship to maternal depression.

H2: Adult health, parental alliance, and family routines will significantly mediate the relationship between food insecurity and maternal depression.

H3: If mothers reported fair/good health, strong parental alliance, and consistent/predictable family routines, the household was able to cope with food insecurity and report lower levels of depression.

Chapter 3 - Methods

Sample

The sample consisted of 444 rural, low-income, mothers from 13 states (California, Hawaii, Illinois, Iowa, Kentucky, Massachusetts, North Carolina, Nebraska, New Hampshire, South Dakota, Tennessee, Texas, and Washington) (Mammen & Sano, 2014). These mothers participated in a cross-sectional study of the multi-state project, NC1171, "Rural Families Speak about Health" (RFSH), which included participating in interviews and conducting surveys (Mammen & Sano, 2014; Mammen & Sano, 2018). RFSH The Urban Influence Codes (UIC) developed by the USDA Economic Research Service (ERS, 2003) were used to measure rurality among recruited counties (Mammen & Sano, 2014). Counties included were code 6 and higher, as 6 indicated the county was nonmetropolitan, and contained a town population of at least 2,500 (Mammen & Sano, 2014).

Eligibility requirements for participants required individuals to be 18 years of age or older, have at least one child 13-years of age or younger, and income level to be at or below 185 percent of the Federal Poverty Line (FPL) (Bauer & Katras, 2007; Mammen & Sano, 2014). In addition, if participant had more than one child, a primary child was selected at random and participant responded to child related measures based on the primary child chosen for the study (Bauer & Katras, 2007; Doudna, 2016). Participating states recruited participants to represent racial and ethnic diversity among the low-income rural population within each respective state; specifically, Latina mothers sought in Iowa, African American mothers sought in North Carolina and Texas, and Asian and Pacific Islander mothers sought in Hawaii (Bauer & Katras, 2007; Mammen & Sano, 2014). RFSH researchers employed mixed purposive sampling (MPS), a hybrid method that combines strengths of purposive sampling and chain-referral sampling, to

recruit participants for the study (Mammen & Sano, 2014). Table 1 summarizes demographic characteristics of sample participants.

Table 1.

Demographics of RFSH Participants

Characteristics	RFSH N=444
	%
Age	
Mean age, years	31.3
Race/Ethnicity	
African American	5.9
Hispanic/Latina	31.1
White, non-Hispanic	55.4
Other	7.6
Marital Status	
Married/partnered	65.0
Single	31.5
Separated/widowed	11.8
Education level	
8th grade or less	9.4
Some high school	16.7
High school/GED	37.9
Business/technical training	7.5
Some college	23.3
College and beyond	5.3

Note. The table was created and derived from Rural, Low-Income Families and their Well-Being: Findings from 20 Years of Research, by Mammen, S., & Sano, Y., 2018, *Family Science Review, 22*(1), p. 5 (https://www.familyscienceassociation.org/wp-content/uploads/2021/07/2018-22-1-INTRODUCTION-revised.pdf). Copyright 2018 by Family Science Association.

Procedure

A secondary data analysis was performed on data from the multi-state project, NC1171, RFSH (Mammen & Sano, 2014; Mammen & Sano, 2018). Data were collected between 2008-2019 and represent a cross-sectional study. Data collection consisted of in-person, computer-

assisted interviews with all 444 participants. Interviews collected data on health, access to community resources, and family context and economic environment (Mammen & Sano, 2014).

Measures

Food security

Household food insecurity was measured using the Six-Item Short Form of the USDA Household Food Security Module and the associated Six-Item Food Security Scale (Bickel et al., 2000; Mammen & Sano, 2014). The module has shown to identify food-insecure households and households with very low food security with reasonably high specificity and sensitivity and minimal bias (Mammen & Sano, 2014). The form does not directly ask about children's food security nor measures the most severe range of adult food insecurity (Mammen & Sano, 2014). Food security scores are based on the household's composition in the last 12 months at the time of survey administration and the number of affirmative responses to questions (Bickel et al., 2000). Food insecurity served as the independent variable for this study. See Appendix A for full measure description. The Cronbach's alpha for this sample was .84.

Mental health - Feelings about how things are going

A shortened version (Andersen et al., 1994) of the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was used to measure participant's mental health status, specifically maternal depression (Mammen & Sano, 2014). The CESD-10 assesses significant depressive symptoms at a cut-off score of 10, has been used as a screening instrument in general and clinical populations, and correlates well with the original 20-item version (Mammen & Sano, 2014). Participants responded to ten statements reporting how often they felt or behaved in the last two weeks (e.g., I was bothered by things that usually don't bother me; I had trouble keeping my mind on what I was doing; I felt that everything I did was an effort) at the time interviews

were conducted. Response choices included: rarely or none of the time (less than 1 day; total points = 0), some or a little of the time (1-2 days; total points = 1), occasionally or a moderate amount of time (3-4 days; total points = 2), and all the time (5-7 days; total points = 3) (Radloff, 1977; Doudna, 2016). Responses were summed and total scores ranged between 0-30 with scores of 10 or higher indicating clinically significant depressive symptoms (Doudna, 2016). Maternal depression serves as an outcome variable for this study. The Cronbach's alpha for this sample was .82.

Adult health

Respondents' health status was measured using the short version (SF-12) (Gandek et al., 1998) of the SF-36. SF-12 Health Survey is a short and generic measure that assesses subjective adult health status (Mammen & Sano, 2014). SF-12 Health Survey includes self-assessment of health, physical functioning; physical role limitation; mental role limitation; social functioning; mental health and pain (Mammen & Sano, 2014). RFSH researchers utilized a modified version of SF-12 Health Survey and modified two questions from the original version of SF-12 Health Survey. Adult health served as a mediating variable for this study. A higher the score on the SF-12 represents better physical health. Refer to Mammen & Sano (2014) for further information.

RFSH researchers (Mammen & Sano, 2014) measured both mental and physical health among participants using the SF-12. Upon further study, five questions measured precisely the same constructs as CESD-10, measuring maternal depressive symptoms which served as a dependent variable within this study. To ensure the dependent variable was represented and captured independently, this study eliminated the five questions measuring mental health within the SF-12 and narrowed down adult health measure to the remaining seven items that measured solely physical health status. The Cronbach's alpha for this sample was .828.

Parenting alliance

The Parenting Alliance Measure (PAM) (Abidin & Konold, 1999) was used to measure child-rearing alliance between parents (Mammen & Sano, 2014). PAM may be used with married, unmarried, and divorced parents (Mammen & Sano, 2014). Participants responded to 20 statements using a five-point Likert scale ranging from 1-5 (strongly agree to strongly disagree) (Mammen & Sano, 2014). Higher scores indicate stronger parental alliance (Mammen & Sano, 2014). Parental alliance served as a mediating variable for this study. Higher scores on the Parenting Alliance Measure represent closer parental alliances. The Cronbach's alpha for this sample was .95.

Family routines

The extent of predictability or routinization in the daily life of a family was measured using a modified version of the Family Routines Inventory (Jensen et al., 1983; Mammen & Sano, 2014). Backed in theory, family routines are considered behaviors which may protect the health and well-being of family members as they provide stability during periods of stress (Mammen & Sano, 2014). Family routines served as a mediating variable for this study. The Cronbach's alpha for this sample was .81.

Control Variables

Sociodemographic variables of race, household income, and educational level have been found as strong correlations with food insecurity experiences and mental health. These variables will serve as controls in the analysis. Maternal education level was determined based on the highest level of school degree obtained or the highest level of education completed and was categorized into eight categories including eighth grade or less, some high school, high school, GED, specialized technical, business, or vocational training, some college, Bachelor's degree,

and some graduate school and graduate degree (Mammen & Sano, 2014). Household income was categorized into eleven levels ranging from 1 = less than $4,999 to 11 = $50,000 and above with each level constructed with $5,000 increments between each categorical level (Mammen & Sano, 2014). Race and ethnicity were determined by selection of African American, Asian/Pacific Islander, Hispanic/Latina, Multi-Racial, Native American, White, non-Hispanic, or Other (Mammen & Sano, 2014).

Data Analysis

SPSS (version 28) was used for all analyses. Normality of data was assessed using descriptive statistics. Reliability tests were conducted for all measured used in this study. Hierarchical multiple regressions were used to examine the relationships between food insecurity, maternal depression, child behavior and whether adult physical health status, parental alliance, and family routines mediated this relationship to alleviate negative maternal mental health outcomes. Sociodemographic variables of race, household income, and educational level have been found as strong correlations with food insecurity experiences and mental health. These variables will serve as controls in the analysis

Chapter 4 - Results

Preliminary Analyses

While race was meant to originally serve as a control variable, after conducted linear regressions among race and maternal mental health, no racial identity served as being significantly related to maternal mental health. Ethnicity of Hispanic and Latina were then considered and after correlations were conducted, Hispanic and Latina ethnicity was considerably correlated to maternal mental health (see Table 1). Therefore, for parsimony, race was excluded in the model and ethnic identity of Hispanic and Latina were included.

An examination of descriptive statistics and Bivariate correlations (see Table 2) was conducted to examine correlations between key variables and the dependent variables, maternal mental health, and child behavioral problems. Household income was positively correlated with maternal depression ($r = .098$, $p = .046$). Education level had a small, positive correlation with maternal depression ($r = .078$, $p = .103$). Food insecurity was positively correlated with maternal depression ($r = -.242$, $p < .001$). Parental alliance was negatively correlated with maternal depression ($r = -.253$, $p < .001$). Family routines was significantly correlated with maternal depression ($r = -.140$, $p = .003$). Child behavior was positively correlated with maternal depression ($r = .331$, $p < .001$). Adult health was significantly correlated with maternal depression ($r = -.521$, $p < .001$).

To examine the extent of relationships between food insecurity and maternal depression symptoms, while defining resilience factors that mediated this connection, three-model hierarchical multiple regressions were performed with maternal mental health (see Table 3) as dependent variables. Controlling for all other variables, race was not significantly related to any predictor variables and for parsimony, was excluded from the model and Hispanic, Latino, or

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Spanish ethnicity was entered in place of race. Hispanic, Latino, or Spanish ethnicity ($M = 3.76$, $SD = 1.85$); household income; and highest education level completed were entered at stage one to control for all variables. Food insecurity was entered at stage two with parental alliance, family routines, child behavior, and adult health entered at stage three. Variables were entered in this order to first determine the relationship between food insecurity and maternal depression and to then identify if resilience factors mediated this relationship.

Table 2

Regression table for relationship between race, Hispanic/Latina ethnicity for predicting maternal mental health

Model		Standardized Coefficients		
		Beta	t	Sig.
1	(Constant)		3.014	.003
	What is your race: (select all that apply) White	.045	.466	.642
	Black, African American	-.040	-.592	.554
	American Indian or Alaskan Native-specify principal tribe	-.003	-.049	.961
	Asian	-.001	-.023	.982
	Pacific Islander	-.026	-.458	.647
	Some other race-please specify	.077	.891	.373
	DON'T KNOW	.020	.288	.774
	Are you of Hispanic, Latino, or Spanish origin?	.272	4.206	<.001

a. Dependent Variable: CESD_SumScore

Table 3

Correlation table for relationship between household income, education level, food insecurity, maternal mental health, parental alliance, family routines, child behavior, and adult physical health.

	Variables	1	2	3	4	5	6	7	8	*M*	*SD*
1	Household income	1	.108*	.008	.098*	-.128*	.009	-.019	.041	2.54	1.67
2	Highest Education Level	.108*	1	-.070	.078	-.057	-.031	.025	.069	3.84	1.85
3	Food Insecurity	.008	-.070	1	.242**	-.177**	-.130**	-.304**	.206**	13.25	3.80
4	Maternal Depression	.098*	.078	-.242**	1	-.253**	-.140**	.331**	-.521**	8.43	5.92
5	Parental Alliance	-.128*	-.057	-.177**	-.253**	1	.230**	-.246**	.103	89.76	11.82
6	Family Routines	.009	-.031	-.130**	-.140**	.230**	1	-.189**	.098*	40.43	7.27
7	Child Behavior	-.019	.025	-.304**	.331**	-.246**	-.189**	1	-.279**	52.93	10.54
8	Adult Physical Health	.041	.069	.206**	-.521**	.103	.098*	-.279**	1	27.99	7.05

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4

Summary of Hierarchical Regression Analysis for Variables predicting Maternal Mental Health

Model		Standardized Coefficients		
		Beta	t	Sig.
1	(Constant)		5.400	<.001
	Are you of Hispanic, Latino, or Spanish origin?	.308	5.273	<.001
	Household Income	.060	1.086	.279
	Highest grade or year of school completed	-.061	-1.052	.294
	R²	.094		
	R Square Change	.094		
2	(Constant)		5.764	<.001
	Are you of Hispanic, Latino, or Spanish origin?	.267	4.519	<.001
	Household Income	.066	1.209	.228
	Highest grade or year of school completed	-.050	-.875	.382
	Total score of food security	-.174	-3.126	.002
	R²	.122		
	R Square Change	.029		
3	(Constant)		8.952	<.001
	Are you of Hispanic, Latino, or Spanish origin?	.144	2.722	.007
	Household Income	.058	1.208	.228
	Highest grade or year of school completed	.023	.461	.645
	Total score of food security	-.071	-1.441	.151
	Adult physical health	-.470	-9.494	<.001
	Family routines	-.006	-.117	.907
	Parental alliance	-.155	-3.122	.002
	R²	.353		
	R Square Change	.231		

a. Dependent Variable: CESD_SumScore

Model Results

The results showed that the first model, which included control variables, was significant (F (3, 299) = 10.28, $p <$ .001, R^2 = .094). The second model (F (1, 298) = 9.77, p = .002, R^2 = .122), which included household food insecurity status, was also significant, consistent with our first hypothesis. The third model also showed statistical significance (F (3, 295) = 35.12, $p <$ .001, R^2 = .353). Overall, the final model which included food insecurity, and the mediating variables of parental alliance, adult physical health, and child behavior accounted for 33.8% of variance in the sample.

The hierarchical regression revealed in model one, with all control variables accounted for, being of Hispanic ethnicity was significantly related to maternal depression (β = .308, $p <$ .001). Household income (β = .060, p = .279) was not significantly related to maternal depression. Highest education level completed was moderately related to maternal depression (β = -.061, p = .294).

In model two, controlling for all other variables, household food insecurity was significantly related to an increase in maternal depression (β = -.174, p = .002). Hispanic ethnicity remained significantly related to maternal depression and food insecurity (β = .267, $p <$ .001). Model two explained 11.1% of variance in maternal depression, (F (1, 298) = 9.77, p = .002, R^2 = .353).

In model three, controlling for all other variables, Hispanic ethnicity remained significantly related to maternal depression (β = .144, p = .007). Household income (β = .058, p = .228) and highest education level completed (β = .023, p = .645) were not significantly related to maternal depression. Household food insecurity was found not found significant (β = -.071, p

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= .151), meaning that parenting alliance, good physical health, and reduced child behavior problems completely mediated the relationship between household food insecurity and maternal depression. Higher rates of parental alliance were found to significantly predict better maternal depression outcomes (β = -.155, p = .002). Adequate adult physical health was found to significantly predict better maternal depression (β = -.470, p < .001). Family routines had no mediating significance between food insecurity and maternal depression (β = -.006, p = .907).

Summary of Results

Being of Hispanic ethnicity was significantly related to higher rates of maternal depression when controlling for all other variables, including food insecurity and all other mediating resilience factors. Food insecurity had a significant relationship to maternal depression when examined independently of risk and protective factors identified by the orienting theories for this study. Higher rates of parental alliance and adult physical health were found as protective factors mediating the relationship between food insecurity and maternal depression. Family routines had no statistical significance in the relationship between food insecurity and maternal depression.

Chapter 5 - Discussion

Although much literature has documented the relationship between food insecurity and mental health (Hernandez et al., 2013; Hanson & Olsen, 2012), a deficit exists in identifying the extent to which resilience factors, specific to rural, low-income mothers and their respective households, account for mediation regarding maternal depression outcomes. Often, food insecurity literature regarding rural communities focuses on lack of resources, deficits experienced, and various risk factors (Braun, 2008; DeWitt et al., 2020) therefore, the purpose of this study was to identify individual-level mediating factors that produce positive outcomes for rural, low-income households, specifically mothers of these households, however, this study indicates that strong parental alliance, absence or low-levels of poor child behaviors, and good adult physical health serve as protective factors among rural, low-income mothers and respective households by mediating the effect food insecurity has on maternal depression.

The results from data analyses support the first hypothesis by identifying a significant relationship between food insecurity and maternal depression. Findings and results from data analyses partially support our second hypothesis that child behavior, adult health, parental alliance, and family routines will significantly mediate the relationship between food insecurity and maternal depression. Strong parental alliance, adequate adult physical health status, and acceptable child internalized, and externalized behaviors represent mediating resilience factors for the relationship between food insecurity and maternal depressive symptomology relating to rural, low-income mothers, supporting the third hypothesis. Conversely, low parental alliance, poor adult physical health status and unfavorable child behaviors may significantly worsen the food insecurity and maternal depression relationship, which was not hypothesized. Family routines had no effect on food insecurity and maternal depression rates, resulting in the rejection

of this part of the hypothesis (H2). As race was excluded from the overall model, but Hispanic ethnicity was entered, results determined that being Hispanic or Latina indicates increased risk of worsened food insecurity and maternal depressive status. The results of this study contribute to theory by exemplifying resilience factors that might provide a means for food insecure mothers to find their way out of mental health crises.

As mentioned earlier in this paper, ethnic disparities largely impact rates of food insecurity and accompanying health problems experienced by Hispanic individuals (Myers & Painter, 2017; Nam et al., 2015; Odoms-Young, 2018), which aligned with findings of the present study. Hispanic ethnicity served independently as a key prominent risk factor to food insecurity and maternal depression. Food insecurity and being single are contributing factors to significant maternal depression among Hispanic women (Downey & Greder, 2014), which may allude to lack of parental alliance worsening depression and food insecurity among Hispanic mothers within our study sample. This study found that household characteristics of Hispanic and Latina families relate to increased risks of experiencing food insecurity and unfavorable depression outcomes.

Our findings align with the ABC-X theoretical model proposed by Hill (1958) that internal coping mechanisms and resources of parental alliance (e.g., effective communication, cooperation, and mutual respect among caregivers), adequate physical health of mother, and absence or low-levels of child behavior problems likely modify associations of household meaning-making assigned to the experience of food insecurity and the overall outcome of maternal depression. These likely represent factors that guide households out of experiencing a crisis. According to the present findings, adequate physical adult health status and strong parental alliance are considerable internal resources with potential to guide a household through

food insecurity and contribute to reduced maternal depression. This makes sense, due to previous literature indicating that support between parental figures and caregivers in association with mutual perception of strong child-rearing practices, serves as a protective factor within high stress situations among rural households (Ontai et al., 2008). Even more, as a household experiences food insecurity, imperative decision-making is inherently present (e.g., deciding is funds should be allocated to food, housing, healthcare, or deciding how to manage costs and in cases of high food insecurity, who should food be rationed out too regarding family members), which are seemingly dreadful and difficult decisions for household members to decide (Alinovi et al., 2010; Greder et al., 2017). Our results indicate that having strong parental alliance, specifically mutual respect, and proper communication between caregivers, and in good physical health regarding caregivers, may produce a positive meaning associated to food insecurity, provide resources and coping mechanisms for the household and in turn, alleviate maternal depressive symptoms in the presence of food insecurity and alleviate the family experiencing a crisis (Greder et al., 2017). Although our findings support family routines not significantly mediating food insecurity and maternal mental health, previous literature (Alinovi et al., 2010; Greder et al., 2017) along with Family Systems Theory (Minuchin, 1974) and Family Stress Theory (Hill, 1958) suggests that family routines and togetherness prove as a strong resilience factor among households facing food insecurity; therefore, future studies should more specifically focus on family routines and family cohesion serving as mediating factor for food insecurity and adverse outcomes. The use of ABC-X model to understand and explain food insecurity and mental health for rural, low-income families highlights the importance of considering various resilience factors that contribute to leading a family out of experiencing crisis and/or considerable family dysfunction. Through the lens of Family Systems Theory

(Minuchin, 1974), strong parental alliance and adequate adult health potentially influenced positive adaptation to experiences of food insecurity among the entire family unit resulting in lower maternal depression rates.

Child behavior, in relation to maternal depression, may be considered both genetic and contextual (Natsuaki et al., 2014). Research suggests that maternal depression is associated with both internalized and externalized behavior and mental health issues among their respective children (Goodman et al., 2011), therefore explaining a positive relationship between child behavior, food insecurity, and maternal mental health. Independent to children, food insecurity has been found to produce mental health disorders and behavioral problems in younger-aged children due to accumulated stress, anxiety, and shamefulness (Burke et al., 2016). Minuchin's (1974) Family Systems Theory helped guide interpretation of such phenomena. In explanation, a child's internalized and externalized behavioral problems, specific to this study, may be explained by long-term observations and of their entire family unit experiencing food insecurity and maternal depression (Minuchin, 1974; Watson, 2012). With Family Systems Theory as a guiding lens for such interpretation, if the household, more specific to the mother, is unable to adapt to the stressors of food insecurity, maternal depression and child behavior may worsen and create overall family dysfunction (Kassop, 1987).

Research indicates rural residing, low-income single mothers, face greater disadvantage and are more likely to endure hardships compared to other counterparts which causes higher food insecurity and mental health rates (Mammen et al., 2009). Our study determined that if mothers are accompanied by a partner, and perceive strong parental alliance between one another, and are in considerably adequate health conditions, food insecurity will not cause unbearable depression

outcomes as these mediating factors are internal resources embedded within the mother and her respective household.

Limitations

These data and analyses, while providing a decent basis for understanding the relationships among risk and resilience factors in low-income, rural mothers, present a few key limitations. First, these data were collected once, from a set of rural mothers that were disproportionately sampled. The study oversampled Hispanic or Latina mothers which produced limitations to the generalizability across varying racial and ethnic populations among rural communities. Another limitation to this study is the overall sample size. Utilizing a larger sample size in future studies for rural communities, may benefit literature in being able to identify differences among various groups of individuals or areas and provide further insight in establishing correlations between variables of interest. Additionally, all measures were completed based on the mother's perceptions and self-reported, therefore, data collection did not account for perceptions or self-reporting of other household members, such as a partner or children. Collecting data from other household members in the future could provide further evidence for correlations between variables of interest.

Another key limitation is the degree of food insecurity in the sample. 45% of respondents reported no risk of food insecurity. A study including a sample of food insecure households might produce a more robust understanding of the relationships among these risk and protective factors for these families. Further, it is unknown if partners were cohabiting at the time data was collected and therefore, lack of parental alliance worsening maternal depression and food insecurity rates cannot be associated with full confidence. Lastly, our study had no data to support and identify meaning-making perceptions assigned to the experience of food insecurity

and mental health suggested through the lens of ABC-X Model (Hill, 1958). There are various other factors that could influence perceptions and meaning making for rural households. Future research could benefit from incorporating study measures to identify perceptions and meaning-making associations.

Implications

The results from this study build on existing evidence that rural families face greater adversities, specifically, challenges associated with food security, mental health, and marginalized ethnic status. Further, the lack of resources for rural populations requires greater attention and expansion in future research, policy action, and practice (Mammen & Sano, 2018). The findings from this study provide evidence that resilience factors such as, but not limited to, parental alliance, favorable health status, and low child behavior problems effectively mediate a household's experiencing crisis or considerable family dysfunction resulting from poor mental health outcomes.

Practice

Backed by the results of this study and previous literature, food insecurity and mental health are significantly correlated; in particular, those who experience food insecurity are at greater risk of experiencing mental health illness and diagnosis and conversely, those who suffer from long-term mental illness are at greater risk if experiencing food insecurity in the future (Bruening et al., 2017; Pourmotabbed et al., 2020; Pryor et al., 2016). It is important for food sector organizations (e.g., food banks/pantries, food programs, non-profit organizations, etc.) to work in collaboration with health care providers, including mental health, primary care providers, and pediatric practitioners. Many healthcare providers routinely screen patients for mental health symptomology during visits, which should continue while also adding screening

for food insecurity in rural communities, as this has potential to intervene for food insecure individuals and their respective households by providing and connecting patient(s) with accessible and appropriate resources, services, and knowledge for short-term reduction and long-term prevention to food insecurity and mental health crisis (Cutts & Cook, 2017). It is imperative for food alleviation organizations and health care providers to not only screen and recognize the signs and characteristics of food insecurity and mental health but to be aware and knowledgeable of community resources and referrals to offer individuals to combat significant dysfunction and/or crisis from mental health and food insecurity.

As our study found parental alliance and adult health as reliant resilience factors among rural populations, a need for sufficient intervention focusing on building up and strengthening parental alliance such as educating rural mothers and respective partners on how to build and strengthen parental alliance, education and building activities surrounding effective communication and conflict resolution techniques, can promote stronger parental alliance and improve overall family functioning which in turn, will better equip rural households to handle food insecurity experiences resulting in lower mental health crisis and stress. Practitioners must also address child behavioral problems in support of alleviating food insecurity and worsened mental health outcomes. Providing parenting classes to educate rural parents/caregivers on fostering positive relationships with their children, how to manage child's behavior, effective communication techniques for parenting, and providing mental health resources and referrals can alleviate high stress-levels within the household, improve family functioning and relationships and in turn, may potentially alleviate negative outcomes of food insecurity and maternal mental health. A simpler first step to addressing child behavioral problems could include screening at

doctor visits in association with food insecurity and mental health screenings as this could

provide insight into all factors of addressing and reducing food insecurity experiences.

Policy

Guided by results of the present study, several policy implications exist. Food assistance

programs, such as Supplemental Nutrition Assistance Program (SNAP) and Women, Infants, and

Children (WIC), currently exist to reduce barriers in accessing adequate amounts of nutritious

foods, benefitting short-term food insecurity alleviation; however, such programs have existed

for many years yet, food insecurity continues to persist at high rates, with even higher rates in

rural communities, and such food assistance programs cannot be deemed effective and must

require reformation (FAO et al., 2022; Office of Disease Prevention and Health Promotion, n.d.).

Based on the findings and theoretical frameworks of this study, a need exists for policymakers to

take multidisciplinary and comprehensive approaches toward inclusivity and simultaneously

addressing mental health resources as part of reducing food insecurity rates among rural

populations. For future policy recommendations, in addition to providing food, SNAP and WIC

could be used as sources to support strong parental alliance, physical health, and reduce child

behavioral problems. Personnel assisting families with SNAP and WIC may also assess

participants, gauge the quality of parental/caregiver relationships, communication qualities, and

conflict resolution skills, as research (Ontai et al., 2008) and findings from the present study

indicate these specific factors as key contributors to level of parental alliance. Based on these

results, a need for resources and assistance to strengthen parental alliance exists. Not only must

policymakers address support for referral systems, but also the resources to which practitioners

make referrals to build resilience must find easy accessibility for those in need. Adequate adults'

and children's health producing positive outcomes in relation to food insecurity and mental

health remain; therefore, policies and funding for programming promoting healthy eating and exercise represent necessary improvements to promote overall adequate health. SNAP and WIC could begin to provide knowledge (i.e., in the form of handouts or infographics) surrounding healthy relationships, and physical and mental health. Even more, policy could benefit from providing SNAP and WIC participants with incentives for engaging in programming aimed at increasing these protective factors.

One policy implication requiring significant attention includes disparities experienced among marginalized ethnic populations, specifically Hispanic families, in terms of food insecurity, physical, and mental health. Policies for marginalized populations need to address systemic inequalities and provide improvements to health outcomes for vulnerable populations. As previously noted, food insecurity does not occur independently, rather causes of food insecurity present as complicated and multidimensional often correlating with poverty, social and economic disadvantage, individual attributes, and political and social environments (Ashby et al., 2016; Staren, 2020; Lee & Frongillo, 2001). Poverty and low median household income proves a key risk factor of both food insecurity and mental health concerns among rural communities (Curtin & Cohn, 2015; Mohatt et al., 2005; Olson et al., 2004); therefore, policymakers should begin by addressing poverty in rural areas by supporting job opportunities, access to educational and job training programs, increased broadband internet access, and implement policies that confront and tackle income inequality.

Women residing in rural areas face higher rates of depression (Downey & Greder, 2014), yet men in rural areas also face mental health challenges, with those attributed to a lack of insurance, under-insurance, and lack of access to mental health resources; therefore, policy makers can increase funding for mental health services in rural areas and support healthcare providers skills

by improving their ability to identify and treat mental health, physical health, and food insecurity issues within rural communities. By understanding and identifying not only health complications, but also food insecurity characteristics, health care providers may then practice treating both matters simultaneously, potentially increasing access and knowledge of community resources for patients.

Research

Numerous studies have examined the relationships between food insecurity and maternal mental health (e.g., Hernandez et al., 2013; Hanson & Olsen, 2012), however, research in identifying individual-level, mediating resilience factors specific to rural, low-income mothers and their respective households lacks a robust body of literature. The present study identified significant relationships among parental alliance, adult physical health, child behavior, food insecurity, and maternal depressive symptomology. Identifying social, economic, and cultural resilience factors among rural households in relation to food insecurity and mental health could further researchers' understanding of complex interactions between food insecurity and mental health experiences among rural households. In identifying multidimensional resilience factors specific to rural populations, policies and practices will be better informed and resources may become more accessible to those in need of such assistance.

As food insecurity is multifaceted, individuals and communities will face significant impacts therefore, future research studies would benefit utilizing a larger, more diverse sample size to fully grasp the scope and impact of food insecurity (Ashby et al., 2016; Staren, 2020; Lee & Frongillo, 2001). In the present study, race was found to have no relationship to food insecurity or mental health, however, we found, Hispanic or Latino/a ethnic background as a significant risk factor to increased food insecurity and mental health. By utilizing a

representative sample, researchers have better chances of identifying significant differences between racial / ethnic groups or relationships among variables of interest (e.g., food insecurity, mental health, and resilience factors).

Although understanding Hispanic and Latino/a perceptions is important to examine as it is a contributing risk factor, this cannot be generalizable to all rural communities; in fact, research identifies food insecurity and health disparities among various marginalized populations (e.g., Black, non-Hispanic) are as significant as any given marginalized population and must therefore be included and addressed in food insecurity research (Office of Disease Prevention and Health Promotion, n.d.). By having a diverse sample, the representativeness of the study will be improved, and results may identify differences among food insecurity experiences and impacts among different populations which will further food insecurity literature and can help build interventions that best fit the needs of specific populations. Future research can also benefit by identifying and exploring how family routines serve as protective factors in the face of food insecurity and mental health for rural households.

Finally, a longitudinal, nationally representative sample of rural, low-income households would provide a greater opportunity to examine the relationships among these constructs. With such a data set, issues of causality and perseverance of relationships would contribute to the research literature immensely. Future research should explore creating and analyzing such a dataset.

Conclusion

The present study provides evidence for the relationship between food insecurity and maternal mental health and mediating resilience factors increasing potential risk and protective factors among rural, low-income mothers and their respective households. Guided by Family

Stress Theory and Family Systems Theory, this study revealed strong parental alliance, adequate physical health of the mother, and acceptable child behavior serve as mediating resilience factors to produce positive maternal mental health outcomes. Findings from this study call for future policies to address social inequities and take multidisciplinary and holistic approaches to be inclusive of addressing mental health resources in accordance with addressing and reducing food insecurity rates among rural populations. This study provides pathways for future research to include larger and diverse samples, identify resilience factors on multiple levels, and explore parental relationships beyond Parental Alliance Measure (PAM) to further address and identify family outcomes and overall family well-being in relation to food insecurity.

References

Abidin, R. R., & Konold, T. R. (1999). *Parenting alliance measure: Professional Manual*. Lutz, FL: PAR, INC.

Achenbach, T. M., Ivanova, M. Y., Rescorla, L. A., Turner, L. V., & Althoff, R. R. (2016). Internalizing/Externalizing Problems: Review and Recommendations for Clinical and Research Applications. *Journal of the American Academy of Child & Adolescent Psychiatry*, *55*(8), 647–656. https://doi.org/10.1016/j.jaac.2016.05.012

Akbari, M., Foroudi, P., Shahmoradi, M., Padash, H., Shahabaldini-Parizi, Z., Khosravani, A., Ataei, P., & Cuomo, M. T. (2022). The evolution of food security: Where are we now, where should we go next? *Sustainability, 14*(6), 3634. https://www.mdpi.com/2071-1050/14/6/3634

Alinovi, L., Mane, E., & Romano, D. (2010). Measuring Household Resilience to Food Insecurity: Application to Palestinian Households. In R. Benedetti, M. Bee, G. Espa, & F. Piersimoni (Eds.), *Agricultural Survey Methods* (pp. 341–368). John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470665480.ch21

Andersen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. American *Journal of Prevenitive Medicine, 10*, 77-84.

Ashby, S., Kleve, S., McKechnie, R., & Palermo, C. (2016). Measurement of the dimensions of food insecurity in developed countries: A systemic literature review. *Public Health Nutrition, 19*(16), 2887-2896. doi:10.1017/S1368980016001166

Austin, A. E., Gottfredson, N. C., Halpern, C. T., Zolotor, A. J., Marshall, S. W., Parrish, J. W., & Shanahan, M. E. (2020). Patterns of Risk and Protective Factors Among Alaska Children: Association with Maternal and Child Well-Being. *Child Development*, *91*(5), 1650–1662. https://doi.org/10.1111/cdev.13356

Ayala, A., & Meier, B. M. (2017). A human rights approach to the health implications of food and nutrition insecurity. *Public Health Reviews, 38*(10). https://doi.org/10.1186/s40985-017-0056-5

Ballard, J., Wieling, E., Solheim, C., & Lang, D. (2020). The Double ABC-X Model of family stress. *Iowa State University*. *3.1: The Double ABC-X Model of Family Stress*. (2020, November 22). Social Sci LibreTexts. https://socialsci.libretexts.org/Bookshelves/Early_Childhood_Education/Parenting_and_Family_Diversity_Issues_(Lang)/03%3A_Family_Theories/03.1%3A_The_Double_ABC-X_Model_of_Family_Stress

Bauer, J. W., & Katras, M. J. (2007). *Rural prosperity: A longitudinal study of rural communities and rural low-income families*. https://peerta.acf.hhs.gov/sites/default/files/public/uploaded_files/ruralprosperity.pdf

Bennett, K. J., Borders, T. F., Holmes, G. M., Kozhimannil, K.B., & Ziller, E. (2019). What is rural? Challenges and implications of definitions that inadequately encompass rural people and places. *Health Affairs, 38*(12), 1985-1992. https://doi.org/10.1377/hlthaff.2019.00910

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Guide to measuring household food security*, Revised 2000. U.S. Department of Agriculture, Food and Nutrition Service. https://nhis.ipums.org/nhis/resources/FSGuide.pdf

Bolin, J. N., Bellamy, G. R., Ferdinand, A. O., Vuong, A. M., Kash, B. A., Schulze, A., & Helduser, J. W. (2015). Rural Healthy People 2020: New Decade, Same Challenges. *The Journal of rural health: Official Journal of the American Rural Health Association and the National Rural Health Care Association*, *31*(3), 326–333. https://doi.org/10.1111/jrh.12116

Braun, B. (2008). Rural, low-income mothers: Persistent problems, possible interventions. *Online Journal of Rural Research & Policy, 3*(6). https://doi.org/10.4148/ojrrp.v3i6.44

Bruening, M., Dinour, L. M., & Chavez, J. B. R. (2017). Food insecurity and emotional health in the USA: a systematic narrative review of longitudinal research. *Public health nutrition*, *20*(17), 3200–3208. https://doi.org/10.1017/S1368980017002221

Burke, M. P., Martini, L. H., Cayir, E., Hartline-Grafton, H. L., & Meade, R. L. (2016). Severity of household food insecurity is positively associated with mental disorders among children and adolescents in the United States. *The Journal of Nutrition, 146*(10), 2019-2026. https://doi.org/10.3945/jn.116.232298

Cancel-Tirado, D., Greder, K., & Wiles, B. B. (2018). Risk and resilience of Latina/o families in rural America: 20 years of research. *Family Science Review, 22*(1).

Coleman-Jensen, A., Gregory, C., & Singh, A. (2014). *Household food security in the United States in 2013*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/webdocs/publications/45265/48787_err173.pdf

Coleman-Jensen, A., Rabbitt, M. P., Hales, L., & Gregory, C. A. (2022a, October 17). *Definitions of food insecurity*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/definitions-of-food-security/

Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2022b). *Household food security in the United States in 2021*. U.S. Department of Agriculture, Economic

Research Service. https://www.ers.usda.gov/webdocs/publications/104656/err-309.pdf?v=2546.9

Coleman-Jensen, A., Rabbitt, M. P., Hales, L., & Gregory, C. A. (2022c, October 17). *Key statistics & graphics*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/

Coleman-Jensen, A., Rabbitt, M. P., Hales, L., & Gregory, C. A. (2022d, October 17). *Measurement*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/measurement/#

Cromartie, J. (2019, October 23). *What is Rural?* U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural.aspx

Curtin, L., & Cohn, T. J. (2015). *Overview of rural communities: Context, challenges and resilience*. American Psychological Association. https://www.apa.org/pi/aids/resources/exchange/2015/01/rural-communities

Cutuli, J. J., Herbers, J. E., Masten, A. S., & Reed, M. G. (2021). Resilience in development. In C.R. Snyder, S.J. Lopez, L. M. Edwards, and S.C. Marques*, The Oxford Handbook of Positive Psychology*, 3rd ed. (pp. 171-188). New York: Oxford University Press. doi: 10.1093/oxfordhb/9780199396511.013.9

Cutts, D., & Cook, J. (2017). Screening for food insecurity: Short-term alleviation and long-term prevention. *American Journal of Public Health, 107*(11), 1699-1700. doi: 10.2105/AJPH.2017.304082

Davis, J. C., Rupasingha, A., Cromartie, J., & Sanders, A. (2022). *Rural America at a glance: 2022 edition*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/webdocs/publications/105155/eib-246.pdf?v=1936.7

DeWitt, E., Gillespie, R., Norman-Burgdolf, H., Cardarelli, K. M., Slone, S., & Gustafson, A. (2020). Rural SNAP participants and food insecurity: How can communities leverage resources to meet the growing food insecurity status of rural and low-income residents? *International Journal of Environmental Research and Public Health, 17*(17). doi: 10.3390/ijerph17176037

Dobis, E. A., Krumen, T. P., Jr., Cromartie, J., Conley, K. L., Sanders, A., & Ortiz, R. (2021). *Rural America at a glance: 2021 edition*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/webdocs/publications/102576/eib-230.pdf

Doudna, K. D. (2016). *Application of the family stress model in populations of rural Latina mothers* [Doctoral dissertation, Iowa State University]. Iowa State University Library.

https://dr.lib.iastate.edu/server/api/core/bitstreams/8119b8fc-9ed1-4bef-9720-96d9291071f0/content

Downey, J., & Greder, K. (2014). Depressive symptomology among rural low-income Latina and non-Latina White mothers. *Family and Health: Evolving Needs, Responsibilities, and Experiences*, 8B, 247-269. doi: 10.1108/S1530-35352014000008B017

Dyk, P. H., Radunovich, H., & Sano, Y. (2018). Health challenges faced by rural, low-income families: Insights into health disparities. *Family Science Review, 22*(1). https://www.familyscienceassociation.org/wp-content/uploads/2021/07/2018-22-1-Health-Challenges-Faced-by-rural-low-income-families_-Dyk-Radunovich-_-Sano.pdf

Economic Research Service (ERS). (2003). *Measuring rurality: New definition in 2003*. USDA. http://webarchives.cdlib.org/sw15d8pg7m/http:/www.ers.usda.gov/Briefing/Rurality/Newdefinitions/

Fang, D., Thomsen, M. R., & Nayga, R. M., Jr. (2021). The association between food insecurity and mental health during the COVID-19 pandemic. *BMC Public Health, 21*(607). https://doi.org/10.1186/s12889-021-10631-0

Fiese, B. H., Gundersen, C., Koester, B., & Jones, B. (2016). Family chaos and lack of mealtime planning is associated with food insecurity in low-income households. *Economic & Human Biology, 21*, 147-155.

Fleming, A. R., Ysasi, N. A., Harley, D. A., & Bishop, M. L. (2018). Resilience and strengths of rural communities. *Disability and vocational rehabilitation in rural settings: Challenges to service delivery*, 117-136. doi: 10.1007/978-3-319-64786-9_7

Food and Agriculture Organization of the United Nations (FAO), International Fund for Agricultural Development (IFAD), UNICEF, World Food Programme (WFP), and World Health Organization (WHO). (2022). *The State of Food Security and Nutrition in the World 2022: Repurposing food and agricultural policies to make healthy diets more affordable*. Rome, FAO. https://doi.org/10.4060/cc0639en

Food Research & Action Center. (2018). *Rural hunger in America: Get the facts*. https://frac.org/wp-content/uploads/rural-hunger-in-america-get-the-facts.pdf

Gandek, B., Ware, J. E., Aaronson, N. K., Apolone, G., Bjorner, J., Brazier, J. E., Mullinger, M., Kaasa, S., Leplege, A., Prieto, L., & Sullivan, M. (1998). Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: Results from the IQOLA project. *Journal of Clinical Epidemiology, 51*(11), 1171-1178.

Garasky, S., Wright Morton, L., Greder, K. A. (2008). The effects of the local food environment and social support on rural food insecurity. *Journal of Hunger & Environmental Nutrition, 1*(1), 83-103. https://doi.org/10.1300/J477v01n01_06

Goodman, S. H., Rouse, M. H., Connell, A. M., Robbins-Broth, M., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review, 14*, 1-27. https://doi.org/10.1007/s10567-010-0080-1

Greder, K. A., Peng, C., Doudna, K. D., & Sarver, S. L. (2017). Roles of family stressors on rural low-income children's behaviors. *Child Youth Care Forum*. doi: 10.1007/s10566-017-9401-6

Gundersen, C., Kreider, B., & Pepper, J. (2011). The economics of food insecurity in the United States. *Applied Economic Perspectives and Policy, 33*(3), 281-303. doi: 10.1093/aepp/ppr022

Gundersen, C., & Ziliak, J. P. (2015). Food insecurity and health outcomes. *Health Affairs, 34*(11), 1830-1839. doi: https://doi.org/10.1377/hlthaff.2015.0645

Hanson, K. L. & Olson, C. M. (2012). Chronic health conditions and depressive symptoms strongly predict persistent food insecurity among rural low-income families. *Journal of Health Care Poor Underserved, 23*(3), 1174-88. doi: 10.1353/hpu.2012.0116

Hernandez, D. C., Marshall, A., & Mineo, C. (2013). Maternal depression mediates the association between intimate partner violence and food security. *Journal of Women's Health, 23*(1), 29-37. doi: 10.1089/jwh.2012.4224

Herrman, H., Stewart, D. E., Diaz-Granados, N., Berger DPhil, E. L., Jackson, B., & Yuen, T. (2011). What is resilience? *The Canadian Journal of Psychiatry, 56*(5), 258-265.

Hill, R. (1958). Social stresses on the family: Generic features of families under stress. *The Journal of Contemporary Social Services, 39*(2), 139-150. https://doi.org/10.1177/1044389458039002-318

Jensen, E. W., James, S. A., Boyce, W. T., & Hartnett, S. A. (1983). The family routines inventory: Development and validation. *Social Science and Medicine, 17*(4), 201-211.

JMP. *The t-Distribution*. (n.d.). Retrieved April 5, 2023, from https://www.jmp.com/en_us/statistics-knowledge-portal/t-test/t-distribution.html

Jones, A. D. (2017). Food insecurity and mental health status: A global analysis of 149 countries. *American Journal of Preventive Medicine, 53*(2), 264-273. https://doi.org/10.1016/j.amepre.2017.04.008

Kassop, M. (1987). Salvador Minuchin: A sociological analysis of his family therapy theory. *Clinical Sociology Review, 5*(1).

Lee, J. S., & Frongillo, E. A., Jr. (2001). Factors associated with food insecurity among U.S. elderly persons: Importance of functional impairments. *The Journal of Gerontology, 56*(2), S94-S99. https://doi.org/10.1093/geronb/56.2.S94

Leight, S. B. (2003). The application of a vulnerable populations conceptual model to rural health. *Public Health Nursing, 20*(6), 440-448.

Long, A. S., Hanlon, A. L., & Pellegrin, K. L. (2018). Socioeconomic variables explain rural disparities in US mortality rates: Implications for rural health research and policy. *SSM – Population Health, 6*, 72-74. https://doi.org/10.1016/j.ssmph.2018.08.009

Mammen, S., Bauer, J. W., & Richards, L. (2009). Understanding persistent food insecurity: A paradox of place and circumstance. *Social Indicators Research, 92*, 151-168. https://doi.org/10.1007/s11205-008-9294-8

Mammen, S., & Sano, Y. (2014). Basebook report: Rural families speak about health (RFSH) (2008-2014). North Central Region, Multi-State Project NC 1171: *Interactions of Individual, Family, Community, and Policy Contexts on the Mental and Physical Health of Diverse Rural Low-Income Families. University of Massachusetts Amherst.*

Mammen, S., & Sano, Y. (2018). Rural, low-income families and their well-being: Findings from 20 years of research. *Family Science Review, 22*(1). https://www.familyscienceassociation.org/wp-content/uploads/2021/07/2018-22-1-INTRODUCTION-revised.pdf

Mammen, S., Berry, A. A., Bird, C., & Chandler, K. D. (2018). Rural low-income families' quest for economic security: It takes more than a paycheck. *Family Science Review, 22*(1).

Manczak, E. M., Williams, D., & Chen, E. (2017). The role of family routines in the intergenerational transmission of depressive symptoms between parents and their adolescent children. *Journal of Abnormal Child Psychology, 45*(4), 643-656. doi: 10.1007/s10802-016-0187-z

Martincheck, K. (2022). *Inflation could drive more families toward food insecurity this summer. Urban Institute*. https://www.urban.org/urban-wire/inflation-could-drive-more-families-toward-food-insecurity-summer

Maxwell, S., & Smith, M. (1992). Household food security: A conceptual review. *Household food security: Concepts, indicators, measurements, 1*, 1-72.

Minuchin, S. (1974). *Families and family therapy*. Cambridge, MA: Harvard University Press.

Minuchin, S., & Montalvo, B. (1967). Techniques for working with disorganized low socioeconomic families. *American Journal of Orthopsychiatry, 37*(5), 880-887.

Mohatt, D. F., Bradley, M. M., Adams, S. J., & Morris, C. D. (2005). *Mental health and rural America: 1994-2005*. U.S. Department of Health and Human Services: Health Resources and Services Administration Office of Rural Health Policy. https://www.ruralhealthresearch.org/mirror/6/657/RuralMentalHealth.pdf

Murthy, V. H. (2016). Food insecurity. *National Library of Medicine, 131*(5), 655-657. doi: 10.1177/0033354916664154

Murray, J. D., & Keller, P. A. (1991). Psychology and rural America: Current status and future directions. *American Psychologist, 46*(3), 220-231. https://doi.org/10.1037/0003-066X.46.3.220

Myers, A. M., & Painter, M. A. (2017). Food insecurity in the United States of America: An examination of race/ethnicity and nativity. *Food Security, 9*, 1419-1432. https://doi.org/10.1007/s12571-017-0733-8

Myers, C. (2021). Food insecurity and psychological distress: A review of the recent literature. *Curr Nutr Rep., 9*(2), 107-118. doi: 10.1007/s13668-020-00309-1

Nagata, J. M., Gomberg, S., Hagan, M. J., Heyman, M. B., & Wojcicki, J. M. (2019). Food insecurity is associated with maternal depression and child pervasive developmental symptoms in low-income Latino households. *Journal of Hunger & Environmental Nutrition, 14*(4), 526-539. doi: 10.1080/19320248.2018.1434101

Nagata, J. M., Ganson, K. T., Whittle, H. J., Chu, J., Harris, O. O., Tsai, A. C., & Weiser, S. D. (2021). Food insufficiency and mental health in the U.S. during the COVID-19 pandemic. *American Journal of Preventive Medicine, 60*(4), 453-461. https://doi.org/10.1016/j.amepre.2020.12.004

Nam, Y., Huang, J., Heflin, C., & Sherraden, M. (2015). Racial and ethnic disparities in food insufficiency: Evidence from a statewide probability sample. *Journal of the Society for Social Work and Research, 6*(2). doi: 10.1086/681574

National Institute for Health Care Management (NIHCM). (2022). *Hunger in America* [Infographic]. https://nihcm.org/publications/hunger-in-america

National Institute on Minority Health and Health Disparities (NIH). (2022, September 30). *Food accessibility, insecurity, and health outcomes*. https://www.nimhd.nih.gov/resources/understanding-health-disparities/food-accessibility-insecurity-and-health-outcomes.html

Natsuaki, M. N., Shaw, D. S., Neiderhiser, J. M., Ganiban, J. M., Gordon, H. T., Reiss, D., & Leve, L. D. (2014). Raised by depressed parents: Is it an environmental risk? *Clinical Child and Family Psychology Review, 17*(4), 357-367. doi: 10.1007/s10567-014-0169-z

New Brunswick Health Council (NBHC). (2020, November 17). *Protective and risk factors explained*. https://nbhc.ca/news/protective-and-risk-factors-

explained#:~:text=Protective%20and%20risk%20factors%20are,overcome%20difficultie
s%20(risk%20factors)

Office of Disease Prevention and Health Promotion. (n.d.). Food insecurity. *Healthy People
2030*. U.S. Department of Health and Human Services.
https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-
summaries/food-insecurity

Odoms-Young, A. M. (2018). Examining the impact of structural racism on food insecurity:
Implications for addressing racial/ethnic disparities. *Family and Community Health, 41*.
doi: 10.1097/FCH.0000000000000183

Olson, C. M., Anderson, K., Kiss, E., Lawrence, F. C., & Seiling, S. B. (2004). Factors
protecting against and contributing to food insecurity among rural families. *Family
Economics and Nutrition Review, 16*(1), 12-20.

Ontai, L., Sano, Y., Hatton, H., Conger, K. J. (2008). Low-income rural mothers' perceptions of
parent confidence: The role of family health problems and partner status. *Family
Relations, 57*(3), 324-334. https://doi.org/10.1111/j.1741-3729.2008.00503.x

Pardeck, J. T. (1989). The Minuchin family stress model: A guide for assessing and treating the
impact of marital disruption on children and families. *International Journal of
Adolescence and Youth, 1*(4), 367-377. doi: 10.1080/02673843.1989.9747650

Pathak, A., Richards, R., & Jarsulic, M. (2022). *The United States can end hunger and food
insecurity for millions of people*. Center for American Progress.
https://www.americanprogress.org/article/the-united-states-can-end-hunger-and-food-
insecurity-for-millions-of-people/

Pourmotabbed, A., Moradi, S., Babaei, A., Ghavami, A., Mohammadi, H., Jalili, C., Symonds,
M. E., & Miraghajani, M. (2020). Food insecurity and mental health: A systemic review
and meta-analysis. *Public Health Nutrition, 23*(10), 1778-1790. doi:
10.1017/S136898001900435X

Pryor, L., Lioret, S., van der Waerden, J., Fombonne, E., Falissard, B., & Melchior, M. (2016).
Food insecurity and mental health problems among a community sample of young adults.
Social Psychiatry and Psychiatric Epidemiology, 51, 1073-1081.
https://doi.org/10.1007/s00127-016-1249-9

Radloff, L. S. (1977). The CESD-D scale: A self-report depression scale for research in the
population. *Applied Psychological Measurement, 1*, 385-401.

Ratcliffe, M., Burd, C., Holder, K., & Fields, A. (2016). *Defining rural at the U.S. Census
Bureau: American community survey and geography brief* (Issue Brief ACSGEO-1). U.S.
Census Bureau. https://www2.census.gov/geo/pdfs/reference/ua/Defining_Rural.pdf

Rosegrant, M. W., & Cline, S. A. (2003). Global food security: Challenges and policies. *Science, 302*(5652), 1917-1919. https://www.science.org/doi/pdf/10.1126/science.1092958?casa_token=rAOyWzjeLwAAAAAA:dJ5NeZmlccrwPUfbft782xmI7fdI3Xx9xiJLilieSLfwzBYMCZTqe6-PA-MmZ3AAD9VyNaJh2mSG4xNP

Rosino, M. (2016). ABC-X Model of family stress and coping. *The Wiley Encyclopedia of Family Studies*. doi: 10.1002/9781119085621.wbefs313

Rothrock, N.E., Amtmann, D. & Cook, K.F. (2020). Development and validation of an interpretive guide for PROMIS scores. *J Patient Rep Outcomes, 4*(16). https://doi.org/10.1186/s41687-020-0181-7

Sano, Y., Dolan, E. M., Richards, L., Bauer, J., & Braun, B. (2014). Employment patterns, family resources, and perception: Examining depressive symptoms among rural low-income mothers. *Journal of Rural Community Psychology, E11*(1).

Shanker, P., Chung, R., & Frank, D. A. (2017). Association of food insecurity with children's behavioral, emotional, and academic outcomes: A systemic review. *Journal of Development and Behavioral Pediatrics, 38*(2), 135-150.

Shim, R. S., & Compton, M. T. (2020). The social determinants of mental health: Psychiatrists' roles in addressing discrimination and food insecurity. *Diversity, Equity, and Inclusion in Psychiatry, 18*(1), 25-30. https://doi.org/10.1176/appi.focus.20190035

Simelane, K. S., & Worth, S. (2020). Food and nutrition security theory. *Food and Nutrition Bulletin, 41*(3), 367-379. doi: 10.1177/0379572120925341

Smalley, K. B., Yancey, C. T., Warren, J. C., Naufel, K., Ryan, R., Pugh, J. L. (2010). Rural mental health and psychological treatment: A review for practitioners. *Journal of Clinical Psychology, 66*(5), 479-489. doi: 10.1002/jclp.20688

Smith, L. C., El Obeid, A. E., & Jensen, H. H. (2000). The geography and causes of food insecurity in developing countries. *Agricultural Economics, 22*(2), 199-215. https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1574-0862.2000.tb00018.x?casa_token=G6GF-_RYjwQAAAAA:twepzLnwZWsvBr9a_ih_3owKHD-RWZo9yZH6z3XiD655xTaac5P3oc9qosbk-QeVsDfMTrB9JayihV3l

Staren, D. (2020). *Social determinants of health: Food insecurity in the United States* (Research Brief No. 41). Altarum Healthcare Value Hub. https://www.healthcarevaluehub.org/application/files/5015/9173/3825/Altarum-Hub_RB_41_-_Food_Insecurity.pdf

Stuff, J. E., Casey, P. H., Szeto, K. L., Gossett, J. M., Robbins, J. M., Simpson, P. M., Connell, C., & Bogle, M. L. (2004). Household food insecurity is associated with adult health status. *Journal of Nutrition, 134*(9). doi: 10.1093/jn/134.9.2330

Thomas, M. M. C., Miller, D. P., Morrissey, T. W. (2019). Food insecurity and child health. *Pediatrics, 144*(4). https://doi.org/10.1542/peds.2019-0397

United Nations Office of the High Commissioner for Human Rights. (2010). *The right to adequate food* [Fact sheet No. 34]. https://www.ohchr.org/sites/default/files/Documents/Publications/FactSheet34en.pdf

Upton, J. B., Cissè, J. D., & Barrett, C. B. (2016). Food security as resilience: reconciling definition and measurement. *Agricultural Economics, 47*, 135-147. doi: 10.1111/agec.12305

Watson, W. H. (2012). Family systems. In Ramachandran V. (Ed.), *Encyclopedia of Human Behavior* (2nd ed.), 184-193. Academic Press.

Wolfson, J. A., Garcia, T., & Leung, C. W. (2021). Food insecurity is associated with depression, anxiety, and stress: Evidence from the early days of the COVID-19 pandemic in the United States. *Health Equity, 5*(1), 64-67. https://doi.org/10.1089/heq.2020.005

Appendix A - Measures/Scales

Food security: Six-Item Short Form of the U.S. Household Food Security Module

1. The first statement is, "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never, true for (you/your household) in the last 12 months?
   a. [ ] Often true
   b. [ ] Sometimes true
   c. [ ] Never true
   d. [ ] Don't know (DK) or refused
2. (I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?
   a. [ ] Often true
   b. [ ] Sometimes true
   c. [ ] Never true
   d. [ ] DK or refused
3. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?
   a. [ ] Yes
   b. [ ] No
   c. [ ] DK
4. [IF YES ABOVE, ASK] How often did this happen – almost every month, some months but not every month, or in only 1 or 2 months?
   a. [ ] Almost every month
   b. [ ] Some months but not every month
   c. [ ] Only 1 or 2 months
   d. DK
5. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
   a. [ ] Yes
   b. [ ] No
   c. [ ] DK
6. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
   a. [ ] Yes
   b. [ ] NO
   c. [ ] DK