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Investigation of the Multidimensional Determinants of Nutritionally Risky Coping Strategies and Tradeoffs in Adults

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INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS
ACCESSING FOOD RELIEF: RESULTS OF THE SUNSHINE STATE HUNGER SURVEY

By

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DCN DISSERTATION PROPOSAL

Submitted in partial fulfillment of the requirements
of the degree of Doctorate in Clinical Nutrition

University of North Florida

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INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

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INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Table of Contents

Acknowledgements	2
Introduction.....	6
Chapter 1: Significance/Literature Review	8
Food Insecurity: Prevalence and Impact.....	8
Food Insecurity: Diet Quality	12
Food Insecurity: Coping Strategies and Tradeoffs	13
Food Insecurity: Multidimensionality.....	22
Chapter 2: Theoretical Framework	27
Experience-Based Food Insecurity Conceptual Model.....	27
Social Ecological Theory	28
Conceptual Model	34
Chapter 3: Methods	36
Study Aims.....	36
Study Design.....	36
Study Participants and Setting	37
Data Collection	38
Data Analysis.....	41
Study Sample: Sunshine State Hunger Survey	48
Chapter 5: Discussion	57
Limitations.....	68
Recommendations for Future Research	69
References.....	70
Appendix A. Sunshine State Hunger Survey.....	80

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

List of Figures

Figure 1 Food Security Levels Continuum.....	9
Figure 2 Food Insecurity and Chronic Illness.....	11
Figure 3 CPS-FSS Survey – Coping Strategies Measure (HESC1- HESCM4)	14
Figure 4 Maxwell's Coping Strategy Index Categories*	15
Figure 5 Feeding America Coping Strategies and Tradeoffs Food Insecurity Measures	16
Figure 6 Interwoven Pathways Linking Food Insecurity and Poor Health.....	18
Figure 7 Food Insecurity by Household Characteristics USDA ERS	21
Figure 8 Experience-Based Food Insecurity Domains Conceptual Model.....	25
Figure 9 Social Ecological Model and Experience-Based Food Insecurity Domains	29
Figure 10 Multidimensional Model of Food Insecurity.....	34
Figure 11 Experience-Based Food Insecurity Domains within the HFSSM	39
Figure 12 Primary Research Aim and Corresponding Statistical Test	43
Figure 13 Social Ecological Model and Experienced-Based Food Insecurity Correlates	45

List of Tables

Table 1. Descriptive Analysis of the Sunshine State Hunger Survey	49
Table 2. Use of Negative Nutrition Coping Strategies and Tradeoffs by USDA HFSSM Food Security Level	50
Table 3. Descriptive Statistics for Frequency of Use of Negative Nutrition Coping Strategies and Tradeoffs at Different Levels of Perceived Food Insecurity	52
Table 4. Experience-Based Food Insecurity Domains Categorized from HFFSM Responses.....	52
Table 5. Variable Cluster Distribution for Coping Strategies, Tradeoffs, and Experienced-Based Food Insecurity Dimension Variables.	54
Table 6. Frequency of Variables by Cluster and Variables of Importance.....	54
Table 7. Frequency of Select SEM Variables by Cluster Membership	55

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Abstract

Multidimensional determinants influence use of negative nutrition coping strategies and tradeoffs in households accessing food relief. The objective of this study is to examine negative nutrition coping strategies and tradeoffs at different levels of food insecurity in households accessing food relief and investigate how these behaviors relate to experience-based food insecurity dimensions and populations at risk. This secondary data analysis is from the cross-sectional Sunshine State Hunger Survey (SSHS) conducted June 2018 to August 2018. Over 600 adults were surveyed capturing households of Floridians who accessed 18 direct service charities and community groups that provide food relief across the Tampa Bay tri-county area - including Hillsborough, Pasco and Pinellas and Jacksonville's Duval County. The survey collected client demographics, health, coping strategies and tradeoffs, well-being, financial hardships, and client's participation in federal nutrition programs. One-way analysis of variance (ANOVA) test indicated a significant relationship, ($F(2,483) = 102.4, p < .001$) between negative nutrition coping strategies and tradeoffs and increasing levels of USDA HFSSM food insecurity status. With greater levels of food insecurity, there were increases in the frequency of use of negative nutrition coping strategies and tradeoffs. There is a significant association between each coping strategy and tradeoff ($p < .001$), except watering down food/drink, and USDA HFSSM food security status. An exploratory two-step cluster analysis identified three homogeneous subgroups, 1) late adult worriers, 2) middle adult traders, and 3) middle / late adult copers. Identifying experience-based food insecurity behaviors, coping strategies and tradeoffs used by participants accessing food relief is a multidimensional approach to address the determinants of household food insecurity.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Introduction

A basic human requirement for all households is to have enough nutritious food to support a healthy eating pattern.¹ Government organizations prioritize adequate food as a population priority through a Universal Declaration of Human Rights.^{2,3} Fundamentally, the United States (U.S.) Centers for Disease Control (CDC) identifies nutritious food as a requirement for a healthy and active life.⁴ Recent estimates in 2019 on food access in the U.S. suggest 13.7 million or 10.5% of Americans had “reduced or inadequate food intake for an active and healthy life for all household members”.^{5,6} Understanding reasons for insufficient food access and how households manage this predicament is of value to reduce negative health consequences and improve quality of life. Food insecurity is defined and assessed by the United States Department of Agriculture (USDA) and determined by availability of nutritionally adequate safe foods.⁷ Measurements of food insecurity by USDA Economic Research Service (ERS) began in 1995 using the Household Food Security Survey Module (HFSSM) to understand “the severity of deprivation in basic food needs as experienced by U.S. households”.⁸ The HFSSM measures are based on a household’s economic ability to afford food, and existing food insecurity literature focuses on identification of food insecurity using HFSSM measures.⁸ The cyclic nature of food insecurity and households use of coping strategies and tradeoffs influence on current HFSSM measurements are elusive and complex and extend beyond affordability of food.⁹ Research suggests the experience of food insecurity and underlying contributors be further explored through use of an experience-based food insecurity domain-based approach.^{10–12} Experience-based food insecurity determinants include domains of worry, utilization, accessibility, availability and stability of food and their impacts.^{9,10,12–14} The current study aims to examine use of negative nutrition coping strategies and tradeoffs at different

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

perceived levels of food insecurity among households accessing food relief and investigate how these behaviors relate to experience-based food insecurity dimensions and subpopulations at risk.

While identification of food insecurity has been reported to entail coping strategies and tradeoffs resulting in the over and under consumption of nutritional inadequate foods, the multilevel influence of these mechanisms is complex.^{6,15} Coping strategy behaviors may include changes to purchasing behaviors such as purchasing inexpensive unhealthy foods, rationing food, and not paying bills to reduce hunger in a household.^{13,16} Utilization of behavioral change theories that address multiple spheres of influence is essential to development of interventional strategies to reduce poor nutrition in food insecure populations.¹⁷ Theoretical models propose mechanistic explanations of human behaviors and contexts for complex environments.¹⁸ McLeroy et al.¹⁹ proposed a Social Ecological Model (SEM) which includes levels of influence specific to health behavior to include intrapersonal, interpersonal, community, and public policy factors. Efforts to understand social ecological factors and food insecurity experiences influencing negative nutrition coping strategies and tradeoffs in households that access food relief is key to addressing behaviors. The SEM theoretical framework is ideal to identify social and environmental influences on people to develop nutrition focused interventions.

The proposed research is a secondary data analysis using collected data from participants accessing food assistance programs in Jacksonville and Tampa Florida areas. Data analysis attempts to understand the relationships between experience-based food insecurity dimensions, use of nutritionally risky coping strategies and tradeoffs, and influence on food insecurity levels.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Chapter 1: Significance/Literature Review

Food Insecurity: Prevalence and Impact

Absence of steady and reliable food to nourish all households for active, healthy living continues to impact a great many people in the U.S.²⁰ Although a great deal of investment in programs that support improvements in food access has occurred, food insecurity influences 10.5% of US families—nearly a similar rate as in 1995, when yearly estimations started.⁶ This is due in part to limitations to current solutions from both government and charitable food providers.²¹ Food insecurity is a serious public health problem in the U.S. and its prevalence and impact involves identifying food insecurity, understanding socioeconomic factors that impact food access and its influence on health outcomes.^{22,23}

Food insecurity refers to USDA ERS's measures of insufficient access to nutritionally adequate foods.⁵ Currently the USDA ERS recommends the use of 4 different Household Food Security Survey modules (HFSSM) which are standardized survey tools to measure food security.²⁴ The use of these tools, along with specific procedures of their use, strengthen validity and reliability of the resulting measures and assure maximum comparability with national statistics on food insecurity and hunger.²⁴ The measures are calculated using a survey tool along with an algorithm to define ranges as: "Food Security to include both *High food security*: defined as "no reported indications of food-access problems or limitations; and *Marginal food security*: defined as "one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake. And Food Insecurity, beginning with: *Low food security*: defined as "reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake; and *Very low food*

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

security: defined as “reports of multiple indications of disrupted eating patterns and reduced food intake”.⁵ The HFSSM captures *household* food insecurity and prevalence of food insecurity within households may not be uniform.²⁵ In addition, food-insecure households are not necessarily food insecure all the time and their position on this continuum may vary (Figure 1).²⁴

Figure 1 Food Security Levels Continuum



Adapted from the USDA ERS Food Security Levels Ranges at <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx#ranges>

Food insecurity is considered a key issue in the U.S. government’s Healthy People 2030 economic stability domain.²⁶ The USDA ERS uses the HFSSM to assess food insecurity in effort to identify and evaluate its prevalence and impact.²⁴ In 2019 the overall food insecurity rate in Florida was 12.0%, compared to the national average of 10.5%.²⁷ This means over 2.5 million Floridians are food insecure. Feeding America’s 2019 *Map the Meal Gap* identifies above average population food insecurity in the three largest cities in Florida - Jacksonville (Duval County 12.6%), Miami, (Miami-Dade County 10.3%), and the Tampa Bay area (12.3%).²⁷ Due to the Covid-19 pandemic food insecurity is on the rise with additional projections by Feeding America’s *Map the Meal Gap* projecting at least a 5% increase in all three counties. Post Covid food insecurity rates are projected to continue to increase food insecurity rates due to the unemployment and changes to US estimated poverty levels.²⁷

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Understanding variations in geographic levels of food insecurity is important because it can inform both person specific and environmental strategies for improved food access.²⁸

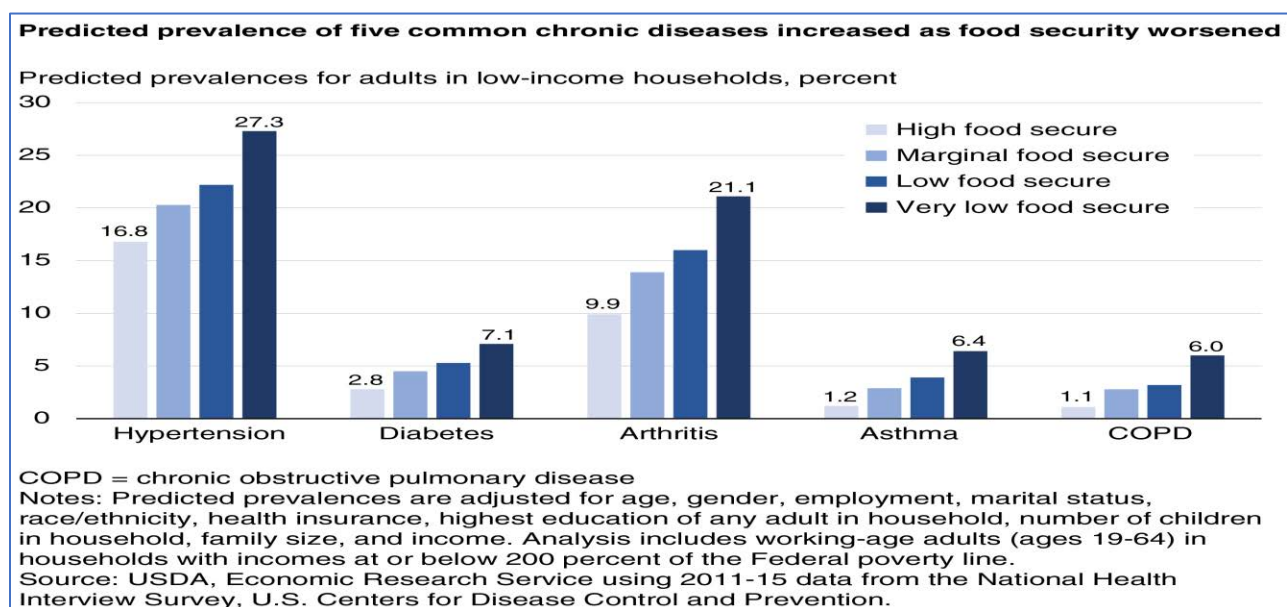
Socioenvironmental factors impact a household's ability to secure adequate food. A basic assumption pertinent to the study of food insecurity is the inability to purchase enough food of adequate dietary quality and is associated with poverty, employment status and local labor conditions.^{13,29} According to USDA ERS, demographic characteristics of those who experience food insecurity at rates greater than the national average include: households with children, households with children headed by a single female; households headed by a Black non-Hispanic or Hispanic individual, households with incomes below 185% of the poverty line, those living in rural areas and cities, those living in south and southwest of the U.S., families of enlisted service members and veterans, college students, and seniors.^{13,30} Hunger in America (HIA) quadrennial studies identified additional competing priorities such as housing, utilities, medical care, transportation and education that present barriers to healthful food purchasing.¹³ A 2020 systematic review and meta-analysis of food insecurity and mental health suggests food insecurity has a significant effect on the likelihood of being stressed or depressed.³¹ General trends apparent in the studies cited illustrate the interplay of factors in the social environment and their contributing challenges to improvements in food insecurity.

Previous research has investigated the impact of food insecurity on health. Food insecurity has been linked to increased chronic disease risk.^{32,33} and poor perceived health.^{33,34} Venci and Lee³² found in an NHANES survey of over 30,000 people that chronic diseases such as arthritis, diabetes and heart disease prevalence are greater in food insecure adults.^{32,35} According to Gregory and Coleman³³, a strong relationship exists between worsening food insecurity and chronic disease risk and poor self-assessed health among working adults. Their

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

study used 2011-2015 NHANES data and included adults in households with income at or below 200 percent of the Federal poverty line and found as food insecurity worsened for adults, predictive prevalence of five common chronic diseases increased, (Figure 2).³⁶ The World Health Organization (WHO) found that food insecurity is strongly and negatively associated with subjective health, quality of life and subjective well-being.³⁴ Additionally, it is well established that food insecurity is linked with higher health care costs on average.³⁷⁻³⁹ Berkowitz et al.²⁸ found a higher prevalence of food insecurity associated with increased health care spending at both the state and local levels. These studies provide fundamental data on the relationships between food insecurity and its impact on health at multiple levels.

Figure 2 Food Insecurity and Chronic Illness



Reference: Coleman-Jensen A, Gregory C, Rabbitt M. Food security in the U.S.: Definitions of food security. Published 2016. Accessed June 24, 2020. <http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Food Insecurity: Diet Quality

A basic assumption pertinent to the study of food insecurity is the negative association with dietary diversity and food group consumption.^{40,41} Food security is dependent on not just the availability of calories, but the ability to regularly consume a variety of nutrient dense foods based on dietary guidelines.⁴² Hanson and Connor's⁴⁰ review of diet quality of food insecure adults and children in the U.S identified higher intakes of processed grains, poor quality proteins, excess sugar sweetened beverages and lower intakes of fruit, vegetables and dairy foods impacting nutrient diversity. Equally important, Johnson et al.⁴¹ adds that food insecurity diminished intake of food groups resulting in lower intakes of fiber, vitamins A, D, Calcium, folate, Iron, and potassium nutrients of health concern according to the 2015-2020 Dietary Guidelines for Americans.⁴⁰⁻⁴² Therefore, identifying food insecurity mechanisms that improve consumption of an adequate variety of food groups and nutrient dense calories improves diet quality.

Food insecurity impacts diet quality contributing to malnutrition. The World Health Organization (WHO) defines malnutrition as “deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients”.⁴³ The burden of food insecurity can result in various forms of malnutrition, to include under or overnutrition resulting in poor health.⁴⁴ The uncertainty of regular availability and access to healthy foods results in coping strategies at multiple levels in households.⁴⁵ The unreliability in the amount of food available in the household, along with inconsistent access to enough food and overall poor nutrient quality impacts nutritional status.⁴⁶ Understanding how nutrition coping strategies and tradeoffs impact food insecurity is important to uncover its layered mechanistic levels of influence on negative nutrition outcomes.²³

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Relationship between malnutrition and food insecurity are well investigated.^{47–49}

Malnutrition is identified by a variety of indicators such as food intake levels and variability in nutrient density, changes in weight and developmental markers, nutrition focused examinations, and the use malnutrition screening tools or individual nutrition assessment.^{44,50,51} Undernutrition is associated with a deficiency in calories and its associated impacts of wasting, stunting and micronutrient deficiencies.^{50,52} The malnutrition paradox of overnutrition is associated with an excess of calories contributing to overweight/obesity, micronutrient deficiencies and diet related diseases in food insecure populations.^{44,53} Spoede et al.⁴⁸ found a positive relationship between food insecurity and over nutrition in children in the U.S. Examination of weight abnormalities in adults who were food insecure by Moradi et al.⁴⁹ suggest overweight and obesity is more positively associated with food insecurity in more economically developed countries. Food insecurity predisposes households to this coexisting double burden of malnutrition.^{47–49,54}

Food Insecurity: Coping Strategies and Tradeoffs

A natural reaction to concerns about insufficient food availability involves survival mechanisms of coping strategies and tradeoffs. Coping strategies and tradeoffs may positively or negatively impact diet quality. Coping is employed by households in response to conditions when they do not have enough to eat.⁵⁵ Households start to restructure their hierarchy of needs in ways that influence food availability and access. The USDA ERS Current Population Survey Food Security Supplement (CPS-FSS) instrument is used to monitor prevalence and severity of food insecurity.⁵⁶ The CPS-FSS provides national data on household spending for food, use of food assistance programs, food security levels and coping strategies.⁵⁶ Coping strategies in the CPS-FSS module are listed in Figure 3.⁵⁶ A review of the data in the 2018 CPS-FSS survey by Coleman, reported that more than an estimated 5.7 million households (4.4%) used food pantries

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

or emergency food assistance in 2018.⁶ It is understood that CPS-FSS does not capture individuals who are homeless or in transient status, so may not fully capture the scope of food assistance program use as a coping mechanism.⁵⁷

Figure 3 CPS-FSS Survey – Coping Strategies Measure (HESC1- HESCM4)

During the past 30 days, did (you/anyone in this household) receive any meals delivered to the home from community programs, “Meals on Wheels,” or any other programs?
During the past 30 days, did (you/anyone in this household) go to a community program or senior center to eat prepared meals? How often did this happen-almost every month, some months but not every month, or in only 1 or 2 months? Did this happen in the last 30 days? Is there a church, food pantry or food bank in your community where you could get emergency food if you needed it?
In the last 12 months, did (you/you or other adults in your household) ever get emergency food from a church, a food pantry, or food bank?
How often did this happen-almost every month, some months but not every month, or in only 1 or 2 months? Did this happen in the last 30 days?

Reference: USDA ERS - Food Security in the United States. Accessed September 21, 2020. [https://www.ers.usda.gov/data-products/food-security-in-the-united-states/food-security-in-the-united-states/#Current Population Survey \(CPS\)](https://www.ers.usda.gov/data-products/food-security-in-the-united-states/food-security-in-the-united-states/#Current%20Population%20Survey%20(CPS))

Coping strategy indices (CSI) are tools used to assess use of nutrition behaviors used by food insecure individuals.¹⁵ Maxwell’s¹⁵ CSI tool, originally used in rural and urban emergency food situations worldwide, measures coping behaviors people use when they cannot access enough food. Maxwell¹⁵ proposes two states of coping, short term, or acute stage and long-term, or chronic stage, alterations in consumption. Research points out that people employ coping strategies before the short term or acute phase which may impact levels of food security status measurements.¹⁵ The 4 categories of coping strategies typical of food insecure households include 1) changes in diet to cheaper foods; 2) short term strategies to increase foods that are not sustainable over the long term; 3) decrease in the quantity of individuals consuming food by sending them elsewhere to eat; and 4) food rationing.¹⁵ Maxwell’s¹⁵ coping strategies categories

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

(Figure 4) can be used and modified to the current situation. Tools to identify household coping strategies are important in determining nutritionally risky coping behaviors.^{45,58,59}

Figure 4 Maxwell's Coping Strategy Index Categories*

1. Dietary Change
a. Rely on less preferred and less expensive foods
2. Increase Short-Term Household Food Availability
b. Borrow food from a friend or relative
c. Purchase food on credit
d. Gather wild food, hunt, or harvest immature crops
e. Consume seed stock held for next season
3. Decrease number of people
f. Send children to eat with neighbors
g. Send household members to beg
4. Rationing Strategies
h. Limit portion size at mealtimes
i. Restrict consumption by adults for small children to eat
j. Feed working members of HH at the expense of non-working members
k. Reduce number of meals eaten in a day
l. Skip entire days without eating.

*Maxwell provides this for a specific geographic situation. This should be modified in context to individual behaviors and context that the CSI is being used.¹⁵

Interest has been generated in food insecurity and coping strategies to better understand behaviors and impacts. Most notably, Feeding America uses survey questions to identify coping strategies and spending tradeoffs (see Figure 5) through the networks' quadrennial research.¹³ Feeding America's HIA 2014 study¹³ found that 55% of households use more than three food extending coping strategies annually. Research by Pinard et al.¹⁶ found the use of the HIA coping strategy indices to be valid and reliable suggesting their use in conjunction with the HFSSM tools. In households with children, research finds additional coping strategies such as adults reducing portions of foods or sacrificing their own nutrition needs to shield disruptions in food.^{40,54,60,61} Concurrently, the parents' efforts to counterbalance adequate food results in changes in diet quality resulting in over or underconsumption of nutritionally inadequate

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

calories.⁴⁰ Households with elderly members employ negative nutrition coping strategies such as food rationing along with increased consumption of less nutrient dense foods contributing to the exacerbation of chronic health conditions, poor health and functional decline.^{62,63} Understanding the range of coping strategies used by households informs initiatives and strategies to improve dietary behaviors that impact diet quality in efforts to reduce negative nutritional outcomes.^{20,40,45,58,59}

Figure 5 Feeding America Coping Strategies and Tradeoffs Food Insecurity Measures

Coping Strategies	Tradeoffs
1. Eating food past expiration date	1. Medical care
2. Grew food in a garden	2. Utilities
3. Sold or pawned personal property	3. Housing
4. Purchased food in dented or damage packages	4. Transportation
5. Purchased inexpensive or unhealthy foods	5. Education
6. Received help from family or friends	
7. Watered down food or drinks	

Adapted from Weinfield NS, Mills G, Borger C et al.. *Hunger in America 2014.*; 2014.

According to the Healthy People 2020 10-year public health objects, food insecurity is a public health priority.⁶⁴ Negative nutrition and health outcomes of food insecurity impacting children, adults and seniors is well studied.^{40,48,49} Negative nutrition coping strategies reducing diet quality contribute to the continuous cycle of food insecurity (Figure 6) proposed by Seligman and Berkowitz.⁹ Initially, reduced access to food results in changes to the diet.¹⁵ This includes purchasing cheaper, inexpensive foods that are “filling or tastier” of high energy density with low nutrient quality.⁴¹ This is linked to statements such as purchasing inexpensive or unhealthy foods.¹³ Some coping strategies resulting in less available calories and micronutrients include watering down food or drinks, splitting meals or saving meals to eat later, eating less, limiting portions, hierarchal prioritization of food access within the household, reducing food

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

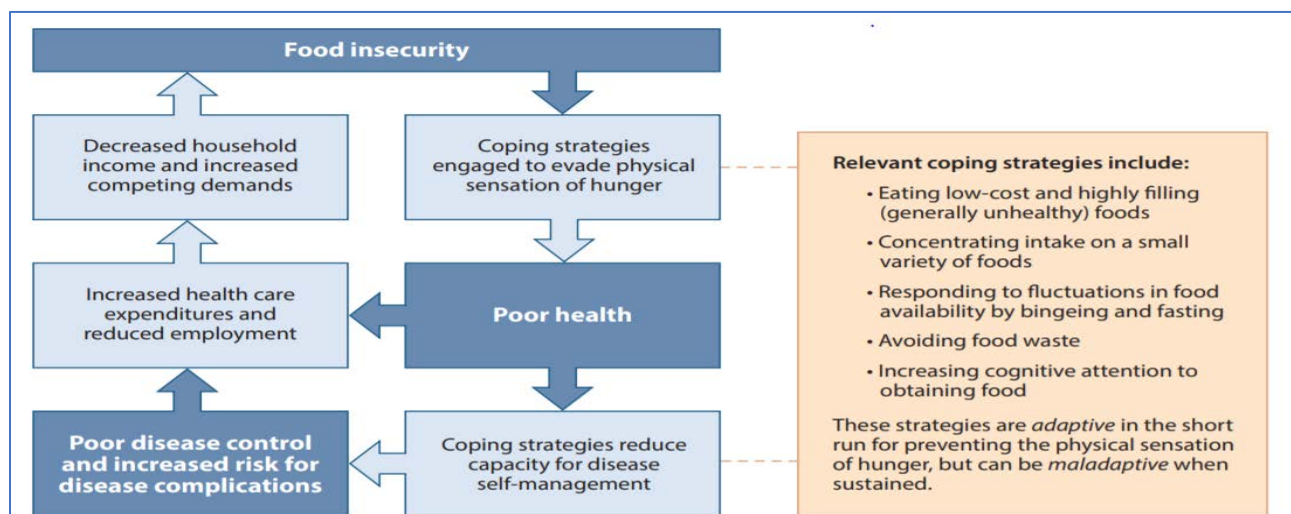
variety and food groups, reduced number of meals and meal skipping.^{13,65,66} Eating expired food to avoid food waste, consuming damaged foods, or obtaining and consuming social unacceptable foods or foods in social unacceptable ways may contribute to health risks.⁵⁹ Cycles of over and underconsumption of food leads to poor nutrient status in efforts to compensate for uncertain food availability.⁴⁴ Furthermore, it is not well understood how worrying about the availability of adequate amounts of healthy food is associated with use of coping strategies.^{31,67} A cyclic model by Seligman and Shillinger⁶⁸ places stress at the center of the food insecurity model influencing limited healthful nutrient intake and compensatory eating behaviors increasing disease progression and poor disease management. Complexities between negative nutrition coping strategies used by households that access food relief programs, impacts on diet quality and food insecurity status is a dynamic process requiring further investigation.⁶⁹

Trading off fundamental necessities such as housing, utilities, medicine and medical care, transportation and education contributes to the economic and health disparities in a household furthering a negative nutrition coping cycle.^{9,16,60,62,65} According to the Bureau of Labor Statistics, housing is the largest expenditure in a household budget followed by transportation, food, health insurance and healthcare, and education.⁷⁰ Tradeoffs for food occur in households based on competing expenditure demands.^{39,68} Feeding America reported that 31% of households traded off food for education for a child or adult even though education is considered a priority to break the cycle of food insecurity.⁶⁵ Food insecurity literature is replete with references to tradeoffs of healthcare, medications and insurance for food in the United States resulting in negative health consequences.^{32,37,71} Poor medication compliance, lack of insurance and poor chronic disease self-management along with poor diet quality further the difficulty of balancing competing demands for nutritious food.^{23,72} Trading off food for transportation has

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

been associated with employment issues, consuming poor-quality foods due to inadequate access to stores with cheaper or healthier foods.^{13,40} A high percent of respondents, 67%, using food assistance programs in the recent Feeding America Hunger indicated they had to choose between food and transportation.¹³ Crucial to the discussion on tradeoffs is the complexity of housing and food. Forgoing utilities, working refrigeration for food storage or cooking resources impact food utilization.¹³ Evaluating how these tradeoffs impact experience-based food insecurity dimensions provides insight into developing people centered solutions based their life stage or situation.⁷³

Figure 6 Interwoven Pathways Linking Food Insecurity and Poor Health



Reference: Seligman HK, Berkowitz SA. Aligning Programs and Policies to Support Food Security and Public Health Goals in the United States. *Annu Rev Public Health*. 2019;40:319-337.

The impact of food insecurity on life stages carries with it different coping strategies or tradeoffs for food. Food insecure households vary to include children, early and middle age adults and/or late adults and the impacts from a public health and nutrition perspective are important to consider.⁴⁰ National statistics report food insecurity in households with children at 13.6%.³⁰ Food insecurity in children in the U.S. is associated with poor overall general health,

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

malnutrition, overweight and obesity, increased emergency department visits, delays in medical and dental care, poor academic performance and depression.^{74,75} In households with children and adults, sometimes only the adults report as food insecure because of shielding children. In a study by Fram et al.⁷⁶ children reported being aware of food scarcity in the household and feeling sad, angry, or scared and feeling physical symptoms such as hunger, tiredness or weakness. Children engage in managing food resources through participating in adult coping strategies or initiating their own to extend food availability.⁷⁶ An understanding of the household composition and types of coping strategies and tradeoffs impacting children is essential.

In 2019, 9 million adults lived in households with low food security.³⁰ The subpopulations and demographics of these adults vary. Nagata et al.⁷⁷ reports that young adults who are food insecure have greater odds of self-reported poor health, hypertension, being overweight and having obstructed airway disease, poorer mental health and sleep disturbances.⁷⁸ Coping strategies and tradeoffs in young adults most often reported binge eating of unhealthy foods, sharing or delaying expenses, using less utilities, stretching meals, decreasing medical and dental care, using food bank/pantry or assistance programs, having multiple jobs, getting help from family, obtaining food from dumpsters or trash, buying cheap foods (fast foods, sugar sweetened drinks, less vegetables and whole grains), binge drinking and selling personal items for money for food.^{77,79,80} It is theorized that early adult's inexperience with managing finances as well as their lack of experience with household expenses contributes to less prioritization of food contributing to food insecurity.^{77,80} Understanding contextual variability of young adults' coping strategies and tradeoffs warrant attention when addressing food security solutions.²⁰

Adults in middle adulthood use coping strategies and tradeoffs associated with their life stage. Findings from over 17,000 low-income midlife adults using the U.S. National Health

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

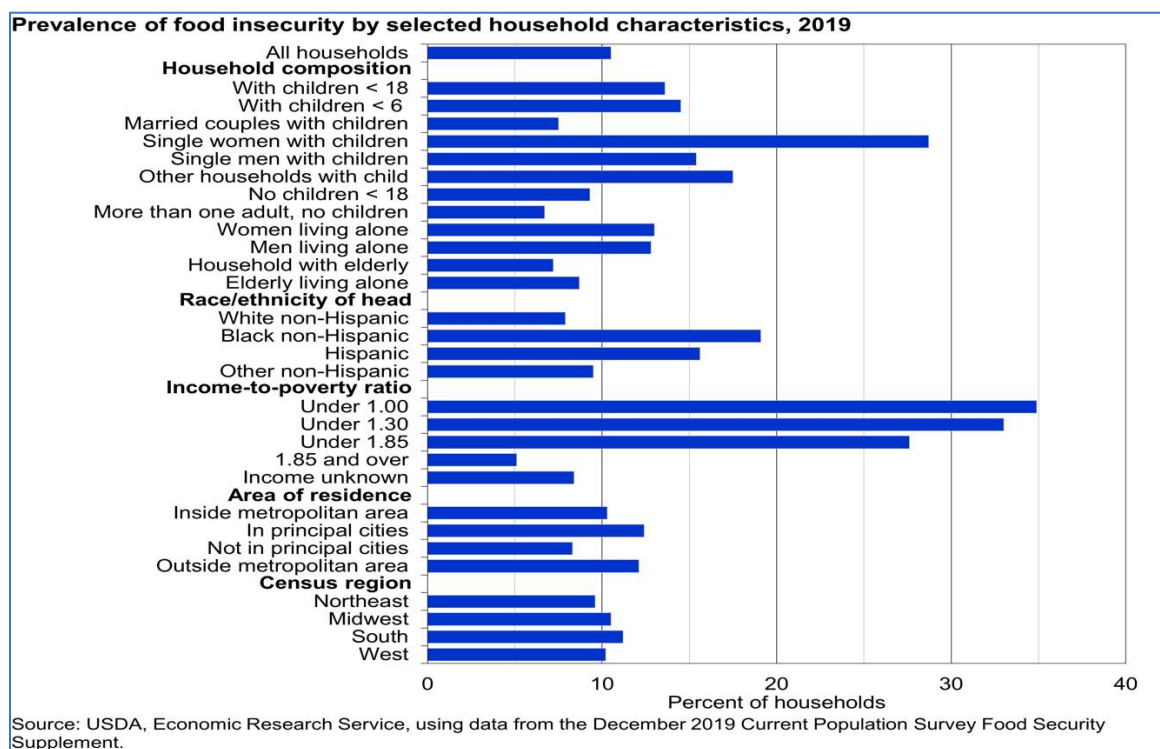
Interview Survey (NHIS) revealed that food insecurity rates were highest in midlife with stronger effects of poor health.⁸¹ Midlife is associated with the onset of chronic disease, disability and financial worry and is considered a pivotal period in the life course due to its unique social, psychological and biological factors.⁸² The 2014 Feeding America report¹³ results identified food assistance program participants as most often adults falling into the 30-49-year age range. Coping strategies and tradeoffs in this life stage are common to coping strategies identified in Maxwells Coping Strategy Index and the Hunger in America study in Figures 4 and 5.^{13,15} Midlife's evolving roles include parenthood, increasing financial worry and strain, limited access to social and community safety nets when resources decline resulting in food insecurity. Characteristics of food insecurity by household are included in Figure 7, which shows highest prevalence in adults with children and incomes below the poverty line.³⁰ Middle adults seek support to cope with food insecurity through use of Not-For-Profit and government food assistance programs such as the Supplemental Nutrition Assistance (SNAP), Women, Infants and Children (WIC), use of reduced price or free school breakfast/lunch/afterschool/weekend programs.¹³ The coping strategies and tradeoffs during this life stage may be relevant to the cyclic nature of households and their movement in and out of the food security continuum.^{68,72}

Hunger in older Americans, or late adulthood has been the subject of much research.^{62,63,83} Food insecurity in late adults is at 8.7% based on USDA ERS statistics in 2019 (Figure 7).³⁰ In May of 2020 Feeding America released its report of Senior Hunger in America for 2018 identifying characteristics of senior food insecurity.⁸³ Factors impacting food insecurity in late adults included declining or fixed incomes, functional decline and chronic diseases, increased medical costs, costs of housing, race and ethnicity disparities, and multi-generational households.⁸³ Suboptimal nutrient intake of food, nutrients and dietary patterns in late adulthood

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

is associated with negative impacts on the lifespan.^{84,85} It has been reported that health compromising coping mechanisms used in late adulthood include cost related medication underuse, postponing medical care, forgoing healthy foods that reduce chronic diet related disease concerns and maintain functional status, and tradeoffs between food and basic necessities.^{23,62,83} Late adults in the 2014 Feeding America report¹³ reported negative nutrition behaviors such as buying cheap food, watering down food or drinks, and less use of SNAP benefits. Additionally, late adults reported experiencing health issues such as diabetes and high blood pressure.¹³ Tradeoffs commonly reported in late adulthood included trading utilities, medical care, housing, and transportation for food.¹³ Interestingly this life stage is one of the lowest reported as food insecure in the 2019 USDA ERS measures, thus it is unclear if their use of coping strategies and tradeoffs impacts their measured food security levels.

Figure 7 Food Insecurity by Household Characteristics USDA ERS



INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Food Insecurity: Multidimensionality

A basic assumption pertinent to the study of food security is the validity and reliability of USDA HFSSM measures to identify the range of experiences, perceptions, and behaviors at the individual and household level.⁵⁷ Identifying food insecurity in the U.S. population provides a measure that can be used to estimate its prevalence and severity.⁸ Use of these standardized tools provides an objective measure for government and other cooperative organizations to increase food security, reduce hunger and provide access to food and a healthful diet.¹¹ The HFSSM are intended to be used in conjunction with other information collected to assess needs, effectiveness, causes and impact of food insecurity and programs on U.S. households.⁵⁷ Additionally, the Current Population Survey Food Security Supplement (CPS-FSS) instrument is used to further investigate food spending, minimum food spending needs, food assistance program participation, food security and coping strategies.⁵⁶ Measurements provide data to support programs, but gaps and limitations still exist as government food and nutrition assistance expenditures contract and emergency food providers are limited by resources.⁸⁶⁻⁸⁸

The National Research Councils, Committee on National Statistics (CNSTAT) reviews the U.S. governments monitoring systems on food insecurity. In its most recent review, it concluded current HFSSM measurements are important and should be continued, and scientific knowledge in this area should be strengthened due to gaps and limitations.¹¹ The panel proposed the development of measurements to address “individual” hunger as potential consequences of food insecurity, which is not a “household” measure as used in the current HFSSM.⁸⁹ Additionally, CNSTAT advises measurements relating to other consequences of food insecurity besides hunger deserve consideration.¹¹ Further suggestions included the creation of tools to address frequency and duration of household food insecurity, and to consider respondent

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

subgroups within a household.⁸⁹ Other survey reflections from the panel included the importance of a measurement of food insecurity and its relationships to hunger, nutritional intake, income, and health.^{89,90}

Current unidimensional constructs of the USDA HFSSM are key to its ability to measure the “severity” levels of food insecurity in a household to estimate its prevalence.^{89,90} The HFSSM uses the latent trait Item Response Theory (IRT) Rasch model that assumes responses to survey items are indicators of a single underlying latent index of food insecurity.^{89,91} Recent literature raises concerns with this assumption of a unidimensional approach in food security measurements which may distort comparisons between the multidimensional nature of households and determinants of food insecurity.⁹¹ The HFSSM is unable to focus on all aspects of food insecurity, but central to its theme is a household's ability to afford food and circumstances around it.⁹⁰ The HFSSM does not currently include other aspects such as food safety, nutritional quality of diets, coping behaviors to augment the household food supply, reduced mobility or function for isolated elderly or ill persons, and adults shielding children from hunger.⁹⁰ Additionally, since the HFSSM is answered by an adult, its ability to identify the severity of hunger at the individual level for children or other members of the household is not specified.⁹⁰ This follows with CNSTAT support in the development of other methodologies to strengthen food security measurements.

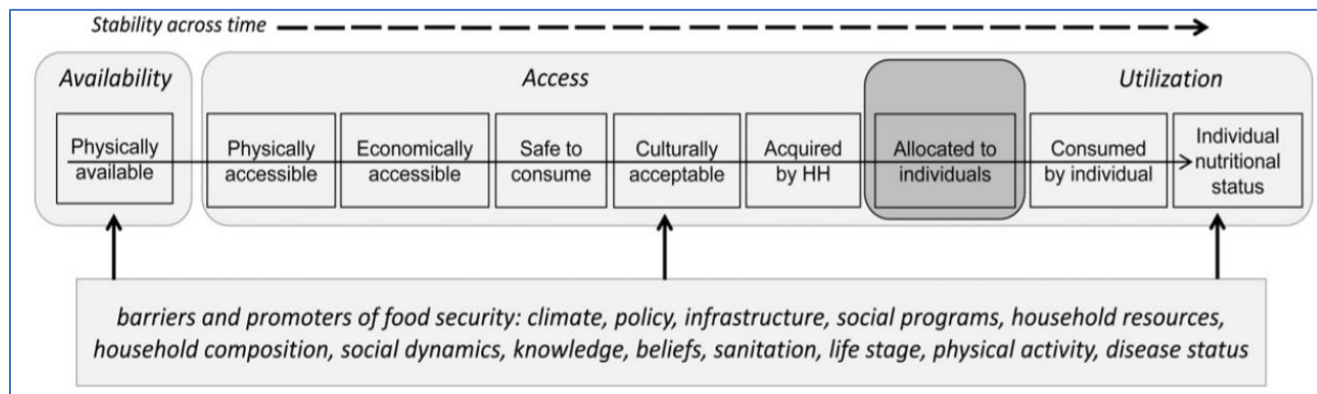
Food insecurity measures attempt to identify the dimensions of food insecurity in effort to understand its determinants. The relevance of Experience-based food insecurity domains is evolving in the literature. The World Health Organization (WHO) and Food and Agricultural Organization of the United Nations (FAO) have long proposed the use of experience-based food security measure domains.⁹² In 2013, Jones et al.¹⁰ looked critically at global measurement tools

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

used to assess food insecurity and Experience-based food insecurity domains assessed by each.¹⁰ Then in 2016, a systematic review by Ashby et al.⁷³ further addressed multidimensionality of food insecurity and concluded tools using the experience-based domain approach more accurately address the true burden of food insecurity. Four dimensions of experience-based food insecurity must be met to reach food security and are categorized as domains of food availability, access, utilization, and stability as seen in Figure 8.^{10,73} Availability is a consideration of enough healthy food for a household, that is reliable and consistent.⁷³ This includes dietary needs for food on a daily and regular basis from groceries or other resources in socially acceptable ways.⁷³ Access considers the resources needed to have food in the household, such as financial or physical accessibility.⁷³ It also considers each household members access to food that fits their dietary needs and food preferences to reach optimal nutritional status.⁷³ Utilization refers to the physiological, sensory, and culturally sufficiency to intake food.⁷³ Cooking, storing, preparing and safely consuming food into meals that provide nutrients to meet the unique nutritional needs of households encompasses utilization. Stability represents the ability to consistently meet food needs of the household through economic and environmental changes.⁷³ Worry is a domain not used in all scales but is included in the HFSSM and in the Food and Agricultural Organization's (FAO) Food Insecurity Experience Scale.^{24,93} Assessment measures which include the thematic experience-based food insecurity domains as determinants of food insecurity levels provide richer tools to understand populations at risk.^{73,90}

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Figure 8 Experience-Based Food Insecurity Domains Conceptual Model



Reference: Jones AD, Ngure FM, Pelto G, Young SL. What are we assessing when we measure food security? A compendium and review of current metrics. *Adv Nutr.* 2013;4(5):481-505.

Published 2013 Sep 1.

To understand what is being assessed when using the HFSSM requires an investigation into the measurement tool. The HFSSM is comprised of a set of self-reporting tools for households to answer questions that evaluate severity of food insecurity. The full 18-question module assesses 4 concerns, 1) anxiety about household food supplies, 2) perceptions that the quality or quantity of food is not adequate, 3) reduced adult food intake; and 4) reduced intake by children all within the context of limited income. Other versions of the HFSSM vary in their scope, are shorter to reduce responder burden, and may either include or exclude children.²⁴

Using these constructs, it is reasonable to place the HFSSM tools in context of the Experience-based food insecurity domains of 1) Worry: Anxiety and uncertainty about the household food supply, 2) Availability: Lack of physical food availability 3) Access: Insufficient food intake and its physical consequences; 4) Utilization: Insufficient Quality (includes variety and preferences of the type of food), 5) Stability: measures over time and ability to stay food secure. The use of Experience-based food insecurity domains is a multidimensional approach to understanding the use of coping strategies and tradeoffs and experiences and impacts to households.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Understanding the prevalence and impact of negative nutrition coping strategies and tradeoffs used by food insecure households is essential to develop effective interventions. Suboptimal eating patterns occur when food assistance program clients use negative nutrition coping strategies and tradeoffs, so it is important to understand experiential dimensionality of these behaviors.^{44,94} A large amount of research identifies negative nutrition outcomes of food insecurity.^{94,95} There is less research on the use of negative nutrition coping strategies and tradeoffs at different food insecurity levels.⁴⁵ As well, current research suggests further investigation is necessary to understand how social environmental factors contribute to nutrition and food insecurity.^{73,96} This research proposes the use of a multidimensional view of the food insecurity experience to explore negative nutrition coping strategies and tradeoffs in vulnerable populations.^{9,10,97}

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Chapter 2: Theoretical Framework

Experience-Based Food Insecurity Conceptual Model

Experience-based measures of household food insecurity strengthen our understanding of its determinants. Research in the early 1990s by Radmer, et al.⁹⁸ described the concepts of the lived experience of not enough food, followed by dietary changes to make limited resources last, and finally decreased consumption in the household and hunger. Hunger is difficult to measure because households use experience-based behavioral coping strategies and tradeoffs to reduce the physical experience of hunger.⁶⁸ Consequently, it is improbable one measure of food insecurity will catch all measurements and components of the food insecurity experience. Experience-based food insecurity modeling provides a way to explore broader issues of food and nutrition security such as food utilization, access, availability, stability and worry and their relationships to types of coping strategies and tradeoffs and ultimately how this impacts food insecurity levels.⁶⁷ Globally, a wide variety of food insecurity measures use experience-based food insecurity theoretical constructs to further understand the nature of food and nutrition security to improve measurements and solutions.^{92,99}

Multidimensionality of the food insecurity experience is further developed using an experience-based food insecurity theoretical model. Experience-based food insecurity theory is a shift from the one-dimensionality of food insecurity to the multidimensionality of behavioral and perceptual responses to food insecurity.^{67,100} Coates et al.⁶⁷ looked at 22 food insecurity scales from 15 countries capturing the common domains that represent the core experiences of food insecurity. Common experience domains in Coates et al.⁶⁷ review included insufficient food quantity, inadequate food quality, uncertainty/worry, and social unacceptability of food. The FAO defines the dimensional experience of food security as worry/anxiety, availability, access,

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

utilization and stability and has developed a food insecurity experience (FIES) module that can be integrated into population surveys.^{1,92} Jones et al.¹⁰ proposed a conceptual pathway for the experience-based food insecurity variables (Figure 8). Using the experience-based food insecurity conceptual model by Jones, et al.¹⁰ provides a way to understand the relationships among the domain variables of availability, access, utilization, and stability across a continuum including barriers and influencers. Literature supports incorporating use of experience-based food insecurity models to address mediators of food insecurity so as not to underestimate its prevalence.⁷³

Social Ecological Theory

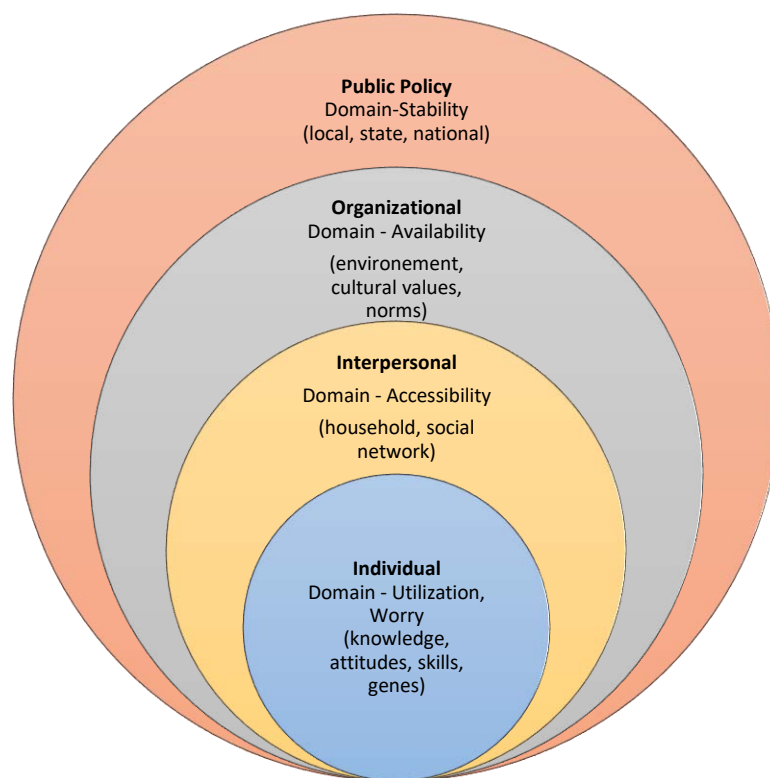
Theoretical modeling provides a framework to evaluate the complexity of influences on food insecurity and align interventions to address nutritionally risky coping strategies and tradeoffs. The Social Ecological Model (SEM) provides a model to understand levels of influence from a socioenvironmental perspective.⁹ Organizing the current research on food insecurity determinants to the SEM model shows how the diverse, interdependent inputs from the environment interact with individuals and households.^{9,14} The SEM theoretical framework can be used to illustrate food insecurity experience domains and their influences on coping strategies and tradeoffs, food security status and ultimately quality of life.^{9,14} This type of modeling is useful to stakeholders to develop shared goals to reduce food insecurity.^{9,17,19}

The Social Ecological Model (SEM) provides an adaptable framework for understanding interrelated components influencing coping behaviors and tradeoffs and impacts on food insecurity status.^{9,14,101–104} The SEM conceptual elements theorize that multiple levels of a person's social environment influence and shape behaviors.¹⁹ The key constructs of SEM are

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

the levels of influence to include the individual, interpersonal, organizational and public policy aspects.¹⁹ The dynamic layers of the SEM theorize that individual knowledge alone is not sufficient for behavior change. The overlapping approach of SEM theory proposes an understanding of how social and environmental factors influence nutritionally risky coping behaviors and tradeoffs to understand their consequences on food insecurity and health, nutrition and well-being.^{9,105}

Figure 9 Social Ecological Model and Experience-Based Food Insecurity Domains



Adaptation from: Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32(7), 513-531 and Peng W, Dernini S, Berry EM. (2018) Coping With Food Insecurity Using the Sociotype Ecological Framework. *Front Nutr.*;5:107.¹⁰⁶

The first level, individual, identifies personal factors that increase the likelihood of using nutritionally risking coping strategies and tradeoffs that negatively influence diet quality.^{19,103,106}

At this level, the Experience-based food insecurity domains of *utilization* and *worry* are

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

positioned.¹⁰ The utilization domain refers to dietary quality and preferences of food specific to the individual.¹⁰ Worry is distinct to an individual and their perceived anxiety or uncertainty regarding the household food supply.^{67,92} Individual level behavior changes to cope with food shortages are influenced by age, gender, race, BMI, employment status, education level, self-reported chronic disease state, self-perceived health status, and emotional well beings (anxiety and depression).^{9,102,103} Rearrangement of individual resources occur at the first level in effort to reduce hunger and meet energy demands.⁴⁰

Negative nutrition coping strategies and tradeoffs at the individual level impact diet quality. Worry about food availability begins with restricting food purchasing or eating less and sometimes binge eating.^{80,107} Worry can influence anxiety and depression and a hyper focus on food access, further impacting coping skills.⁶⁷ Coping behaviors and tradeoffs that reduce nutrient quality include attempts to extend food by eating food past expiration dates; purchasing and obtaining damaged or discarded foods; watering down foods and eating less so children or others have enough food.^{13,40} As purchasing power is reduced, inexpensive low nutrient quality foods that are energy dense calories (such as refined grains, sugars, saturated fats, highly processed with more sodium) foods push out whole grains, fresh fruits and vegetables and lean proteins.⁴⁰ Individuals' nutrition and health related skills, knowledge, attitudes, motivations, and personality traits influence behaviors at this level.¹⁸ Coping strategies and tradeoffs at the SEM individual level are meaningful since they impact immediate calorie needs and are centered around alleviating hunger.⁴⁰ Recognizing if coping strategies and tradeoffs at the interpersonal level and utilization/worry domains are used short term or long-term guides impacts and interventions.⁴⁰

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

The second level of the SEM, interpersonal, considers social relationships, identity and support systems of family, friends, and peer networks and their influence on food insecurity.^{19,103,106} Food insecurity experience domain of *accessibility*, interpreted as insufficient food intake and its physical consequences, occurs at this level.^{10,14} This level is often referred to as the household level, since it considers a household's composition such as marital status, number of people in a household, age groups in the household, and work status of household members.^{9,14} A household is an important influencer on the ability to access enough food to reduce the physical consequences of food restriction.¹³ Social relationships within and outside of the household influence access to food. Access may be positively or negatively influenced by these relationships. For example, research has shown that diminished social support negatively influences nutrition intake for the elderly, women and children through reduced food access and poor diet quality.^{41,74,108} Consideration of influences at the interpersonal level on dietary behaviors along with barriers to access healthy foods enables researchers to design more effective interventions.

Spending tradeoffs begin at the household level, as resources tighten. Negative nutrition coping strategies at the interpersonal level result in further reducing nutrient quality of the diet and either over/under consumption of calories, as well as restrictions in micronutrient intakes.^{40,44} Impairments in access to enough food at this level result in meal skipping to extend food, buying cheap high calorie processed food and meals, splitting meals and saving food to eat later.^{71,94} Household budgeting includes reprioritizing spending on utilities, buying bulk or using coupons to stock up on calories of any quality, buying less food, prioritizing who eats or who gets more food at meals, pawning or trading for money or food, growing food or hunting, using up savings, and decrease spending on education, and hygiene products.^{15,59,69} Tradeoffs of

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

medicine or medical treatment for diet related conditions such as diabetes, cardiovascular disease, hypertension and obesity can exacerbate due to concurrent reduced diet quality.⁹⁵

Layered multidimensional coping strategies and tradeoffs at the interpersonal level impact food access and are capable of impacting diet quality and food insecurity status.

The third level, organizational and community, refers to the environment where social relationships occur and identifying the characteristics of these settings.^{19,103,106} This includes the physical and social (culture, values, norms) environment. Experience-based food insecurity domain *availability* at this level refers to the lack of food availability in the environment.^{9,14,67} When household resources are exhausted this results in households running out of food and reporting of not eating for a whole day and hunger.^{13,45,58} Households are forced to seek community food assistance resources such schools, churches, military affiliations, clubs, home delivered meal programs and food pantries for help.⁷¹ Barriers that result in negative nutrition coping strategies include the lack of access to and limited help maneuvering and understand programs available in the community.¹⁰⁹ As well, not all charitable food is healthful, and quality of food consumption can vary when a household is reliant on charitable food.⁶⁶ Social cohesion in communities of similar races, ethnicities, cultures, common languages may contribute positively or negatively to nutrition related coping strategies or tradeoffs.^{14,103} Access to green space to grow food is a positive coping strategy but is dependent on the household's environment. Consideration of organizational and community characteristics assists in understanding the types of interventions needed at this level.

Spending tradeoffs in the physical environment include trading off utilities, housing, transportation for food.¹³ Housing status, and availability of cooking and cold food storage,

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

utilities and transportation access is linked to decreased consumption of fruits, vegetables, whole grains and lean proteins and increased use of processed foods.^{13,40} Food environments in socially disadvantaged or economically depressed areas have disproportionately less healthful food access with a concurrent abundance of low-quality food access contributing to the food insecurity continuum.^{110,111} Negative nutrition related compensatory behaviors are linked not only to the economics of food availability but to the availability of resources in the environment where people live.

The fourth level, public policy, includes society and system level factors such as healthcare, food assistance programs and economic stability of the environment.^{19,103,106} Experience-based food security domain of *stability* represents the ability to consistently meet food needs of the household through economic and environmental changes. Healthcare improves overall health and reduces health disparities, though food insecure individuals often trade healthcare for food.^{13,23} Government food assistance program can improve stability and diet quality, but barriers exist to access and understanding how to participate in programs.⁹⁴ The stability of food security varies dependent on access, stability and funding to infrastructure programs such as the Supplemental Nutrition Assistance Program (SNAP); Woman, Infants and Children (WIC); free and reduced school breakfast, lunch, and afterschool programs; backpack weekend food programs; Meals on Wheels; and senior congregate meal programs.¹³ Food insecure households that run out of food cope with insufficient food access by use of emergency assistance programs for short term hunger relief can result in positive and negative diet quality.^{6,109,112,113} Economics of income, livable wages, cheap low nutrient density food, and housing can add to the negative nutrition coping strategies and tradeoffs and require government and policy interventions at state and federal levels.¹⁶ Insight into contributions of

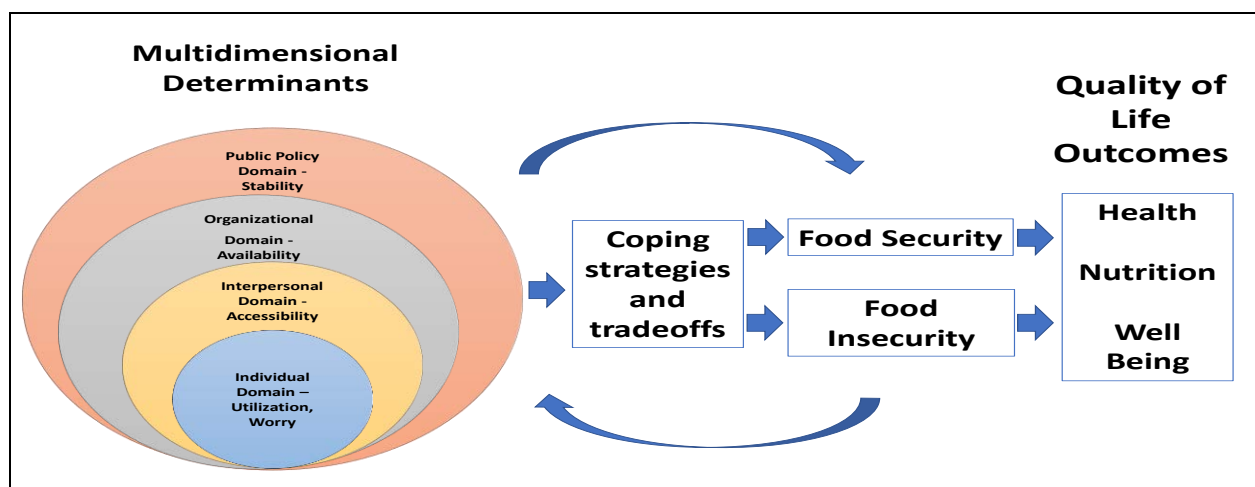
INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

different layers of the SEM to coping strategies and tradeoffs is essential for setting priorities and allocating resources to decrease negative nutrition behaviors.

Conceptual Model

For the purpose of this research a proposed conceptual Multidimensional Model of Food Insecurity uses the SEM and experience-based food insecurity dimensions to explore negative nutrition coping strategies and tradeoffs and impacts on food security levels and quality of life outcomes (Figure 10). This model illustrates the cyclic nature of variables influencing coping strategies, levels of food insecurity and nutrition. A proposed conceptual framework presents a reciprocal ecosystem to understand determinants of food insecurity and the socioecological environmental influence of coping strategies and tradeoffs and food insecurity levels. This is a useful tool for dietetics and nutrition practitioners to drive practice interventions and improve diet quality outcomes.¹⁷

Figure 10 Multidimensional Model of Food Insecurity



Both the SEM conceptual theory and experience-based food insecurity model provide frameworks to investigate the multidimensionality of negative nutrition coping strategies and

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

tradeoffs.^{9,10,14,73} Current research exploring experience-based food insecurity variables within the SEM and relationships to coping strategies and tradeoffs is limited.^{9,10,14} The two proposed models discussed have gaps and overlaps. Separate of each other, the experience-based food insecurity domain model lacks the social environmental influence of the individual, interpersonal, organizational, and public policy variables of interest.⁹⁶ The SEM is not specific enough to food insecurity constructs alone without the integration of common core experience-based food insecurity variables of worry, utilization, accessibility, availability and stability.⁶⁷ Both models provide frameworks for understanding interrelated behavioral mechanisms and potential mediators influencing food insecurity, and the concept of food insecurity as a multidimensional construct.¹⁶ Combining the two models provides a way to assess the multidimensional socioenvironmental variables of influence on coping strategies, tradeoffs and food insecurity.^{9,14}

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Chapter 3: Methods

Study Aims

The current study seeks to explore use of negative nutrition coping strategies and tradeoffs at different food insecurity levels and experience-based food insecurity dimensions using data from the Sunshine State Hunger Survey (SSHS). The *primary objective* is to examine use of negative nutrition coping strategies and tradeoffs at different perceived USDA HFSSM food insecurity levels among households accessing food relief and investigate how these behaviors relate to experience-based food insecurity dimensions and subpopulations at risk. Understanding *experiences* of food insecurity, beyond the economics of the HFSSM, provides an additional tool for addressing coping behaviors.

Study Design

A secondary data analysis of the cross-sectional data from the Sunshine State Hunger Survey (SSHS) investigated self-reported answers to quantitative survey questions about respondents' personal experiences regarding food security. Food assistance program participants completed a 48-question paper-based survey in 2018 administered in Jacksonville and Duval counties of Florida. The survey explored demographics, experiences, health, personal and economic circumstances of households accessing food relief.

For the current study, data from the Sunshine State Hunger Survey (SSHS) was used to investigate negative nutrition coping strategies and tradeoffs used by households accessing food relief. Associations between survey respondents self-reported HFSSM scored food security level and use of negative nutrition coping strategies were explored. The Sunshine State Hunger Survey (SSHS) data set surveyed twelve negative nutrition coping strategies to include eating

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

food past expiration date, pawning/selling personal property, purchasing food in dented or damaged packages, purchasing inexpensive unhealthy food, watering down food or drinks, eating less so children or others have enough food, and tradeoffs of medicine, utilities, housing, transportation, education, and saving meals to eat later.^{13,15,16,45,58,59} Additionally, the USDA HFSSM module survey questions were categorized by experience-based food insecurity domains of worry, utilization, access, and availability. Stability is not measured in the USDA HFSSM used for these data set but were explored through the SEM model. The multidimensional experience-based food insecurity domains provide variables of greater depth as compared to the food insecurity score.^{67,114} Frequency and types of negative nutrition coping strategies and tradeoffs were explored along with relationships to household food security level measures (HFSSM).

Study Participants and Setting

The Sunshine State Hunger Survey (SSHS) was a cross sectional survey of Floridians who accessed direct service charities and community groups that provide food relief across Tampa Bay tri-county area - including Hillsborough, Pasco and Pinellas and Jacksonville's Duval County (Appendix A). Survey responses captured self-reported data from over 600 adults 18 years of age and older, from 18 sites, between June and August 2018. Researchers at the University of North Florida developed the SSHS in coordination with the Tampa Bay Hunger Network based on the 2014 Feeding America Hunger Study.⁶⁵ Questions in the survey were designed to capture client demographics, health, coping strategies and tradeoffs, well-being, financial hardships, and client's participation in federal nutrition programs. Participants actively accessing food relief agencies provided the rationale for choosing their participation in the study. The University of North Florida Institutional Review Board approved the study protocol

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

(Appendix B). Inclusion criteria were pantry use on the day of the survey and age 18 years or older, all others were excluded.

Data Collection

Collected data from the Sunshine State Hunger Survey (SSHS) explored key drivers and resulting effects of Floridians accessing food relief. Validated measures in the survey included the USDA Self-Administered Food Security Survey Module (HFSSM) for Children Ages 12 Years and Older to establish food security status, the WHO-5 Well Being Index to assess depression, the GAD-7 Generalized Anxiety Disorder tool to measure anxiety, as well as questions on demographics, coping strategies, tradeoffs, medical health issues and food assistance program use.^{24,115,116} Data is comprised of categorical, continuous and scale within the survey research (see Figures 12 and 13).

Administration of the Sunshine State Hunger Study (SSHS) surveys was carried out by public health and nutrition students and employees at participating non-profit organizations who were trained by the principal investigator. Food relief agencies involved in the survey advertised for recruitment and included a description of the project and the day it would take place. Participants were provided a description of the research and if willing to participate, completed a signed consent form. Individuals who agreed to participate in the survey were interviewed privately. Based on an a priori power analysis, a minimum of 400 participants was needed to detect a large effect size. Research assistants collected and entered the data for analysis.

Food insecurity

Household food insecurity conditions were assessed using the 9-item U.S.D.A. Household Food Security Survey Module (HFSSM) for self-administration by children ages 12

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

and older.^{24,117} Affirmative responses to the HFSSM are coded as one for “a lot” and “sometimes”, and zero for “negative as “never” for each question. The sum of the affirmative response to the nine questions was classified into a scaled score to determine food insecurity categories of: 6-9 as very low food security, 2-5 as low food security, 1 as marginal food security, and 0 as high food security.²⁴ Missing data for the HFSSM module followed procedures by Bickel et al.⁹⁰ using scaled scores for missing responses.²⁴

Experience-based food insecurity domains

Questions within the HFSSM were used to categorically describe the multidimensional experience-based food insecurity domains of worry, utilization, accessibility, and availability based on experiences described as relevant predictors in the literature review.¹⁰ Experience-based food insecurity domains were categorized within the HFSSM (Figure 11). Each domain was scale scored the same as the HFSSM. All measured HFSSM survey responses were categorized by domain and proportion of affirmative responses reported.¹¹⁸ The sum of affirmative item responses within each of the domain's worry, utilization, access and availability reflected severity, like the FIES.⁹⁹

Figure 11 Experience-Based Food Insecurity Domains within the HFSSM

I.	Worry - Anxiety and uncertainty about the household food supply: <ul style="list-style-type: none">• Do you worry that the food at home will run out before you have money to buy more? (HFSSM Q1)
II.	Utilization: Insufficient <i>Quality</i> (includes variety and preferences of the type of food): <ul style="list-style-type: none">• Do your means include a few kinds of cheap foods because you running out of money to buy foods? (HFSSM Q3)
III.	Access: Insufficient food intake and its physical consequences: <ul style="list-style-type: none">• How often are you not able to eat a balanced meal because you do not have enough money for food? (HFSSM Q4)• Do you have to eat less because you don't have enough money to buy food? (HFSSM Q5)• Do you cut the size of your meal because you don't have enough money for food? (HFSSM Q6)

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

- Do you have to **skip a meal** because you don't have enough money for food? (HFSSM Q7)
- IV. **Availability:** Lack of physical food availability.
- Does the food that you buy **run out** and you don't have money to get more? (HFSSM Q2)
 - Are you ever **hungry** but don't eat because you don't have enough money for food? (HFSSM Q8)
 - Do you not eat for a **whole day** because you don't have enough money for food? (HFSSM Q9)

Social ecological model and food insecurity correlates

SEM variables from the Sunshine State Hunger Survey (SSHS) at the *individual level* included the negative nutrition coping strategies and tradeoffs of eating food past expiration date, pawning/selling personal property, purchasing food in dented or damaged packages, watering down food or drinks, eating less so children or others have enough food, and trading off medicine for food. *Individual level* SEM demographic and household characteristics also included age, gender, race, BMI, employment status, education level, self-reported chronic disease state, self-perceived health status, and emotional well beings (anxiety and depression). Coping strategies and tradeoffs, age, and the experience-based food insecurity domains of worry and utilization were explored at this level of the SEM.

At the SEM *interpersonal level*, negative nutrition coping strategy and tradeoffs variables included skipping meals to extend food, pawning or selling personal property, purchasing inexpensive unhealthy food, trading off medicine, utilities, housing, transportation, education, and saving meals to eat later. *Interpersonal level* SEM demographic and household characteristics also included age groups in the household, housing status, marital status, number of people in a household, and work status of household members. Coping strategies and

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

tradeoffs, age categories, and the experience-based food insecurity domains of accessibility were explored at this level of the SEM.

At the SEM *organizational level*, negative nutrition coping strategies and tradeoffs on utilities, housing, education, and transportation were included. *Organizational level* demographic and household characteristics also included student and military status, language spoken at home, housing, working and available hot food prep and cold food storage, and type of transportation. Only coping strategies and tradeoffs, and the experience-based food insecurity domains of availability levels were explored at this level of the SEM.

At the SEM *public policy level*, negative nutrition coping strategies and tradeoffs included healthcare status and frequency of use of emergency food assistance programs. *Public policy level* demographic and household characteristics included participation in food assistance programs and types.^{9,96,103} From a public policy level, these variables were explored for each cluster to understand relationships for population subgroups.

Data Analysis

The *first aim* of the current study was to explore the use of negative nutrition coping strategies and tradeoffs among households accessing food assistance programs at different levels of perceived food security as determined by the USDA HFSSM levels of very low, low, marginal, and high. The question of interest here was if food insecure households used negative nutrition coping strategies and tradeoffs more than food secure households. It was hypothesized that increased severity of food insecurity level would be associated with households increased use of negative nutrition related coping strategies and tradeoffs impacting diet quality.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Aim #1 – Explore the use of negative nutrition coping strategies and tradeoffs among households accessing food assistance programs at different levels of perceived food security as determined by the USDA HFSSM levels of very low, low, marginal, and high.

H₁: Food insecurity will be associated with participants use of nutritionally risky coping strategies and tradeoffs impacting diet quality.

H₀: There is no significant difference between the use of negative nutrition coping strategies and tradeoffs and different levels of food insecurity.

For the first aim, we explored associations between the dependent variables, negative nutrition coping strategies and tradeoffs, and the independent variables of food security level measured as very low, low, marginal, high. (see Figure 12) The Sunshine State Hunger Survey (SSHS) data set surveyed twelve negative nutrition coping strategies to include eating food past expiration date, pawning/selling personal property, purchasing food in dented or damaged packages, purchasing inexpensive unhealthy food, watering down food or drinks, eating less so children or others have enough food, and tradeoffs of medicine, utilities, housing, transportation, education, and saving meals to eat later.^{13,15,16,45,58,59} Positive nutrition coping survey questions included strategies such as growing food in a garden, receiving help from family and friends and participation in food assistance programs and will be explored separately.^{13,15,16,45,58,59} The dependent variables, coping strategies and tradeoffs were explored based on affirmative responses. A one-way analysis of variance (ANOVA) with an alpha of .05 was used to explore the use of negative nutrition coping strategies and tradeoffs at different levels of the USDA's HFSSM food insecurity status categories.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Figure 12 Primary Research Aim and Corresponding Statistical Test

Aim #1 Explore the use of negative nutrition coping strategies and tradeoffs among households accessing food assistance programs at different levels of perceived food security as determined by the USDA HFSSM levels of very low, low, marginal, and high.			
<i>Research Question: Do food insecure households use negative nutrition coping strategies and tradeoffs more than food secure households?</i>			
Independent Variable	Dependent Variable	Proposed Statistical Analysis	Constructs Assessed
Food Security Level Categorical variables: very low, low, marginal, high Level of measure – Ordinal (4 categories)	Negative nutrition coping strategies and tradeoffs Continuous variables categorized based on affirmative response Level of Measure – Interval (frequency of use) Negative Nutrition Coping & Tradeoffs, 12 total: 1) eating food past expiration date, 2) pawning/selling personal property, 3) purchasing food in dented or damaged packages, 4) purchasing inexpensive unhealthy food, 5) watering down food or drinks, 6) eating less so children or others have enough food, 7) medicine, 8) utilities, 9) housing, 10) transportation, 11) education, 12) and saving meals to eat later	One-way ANOVA Alpha .05	Negative Nutrition Coping Strategies and Tradeoffs

The *second aim* of the current study was to explore the use of negative nutrition coping strategies and tradeoffs used by households accessing food assistance programs at different levels of experience-based food insecurity dimensions and SEM. The question of interest here was what does the use of coping strategies and tradeoffs and experienced-based food insecurity domains tell us about populations accessing food relief? It was hypothesized that there would be heterogeneity of subgroups of a population sample accessing food assistance programs and their

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

use of nutrition related coping strategies and tradeoffs and experience-based food insecurity dimensions.

Aim #2 – Explore the use of negative nutrition coping strategies and tradeoffs used by households accessing food assistance programs at different levels of experience-based food insecurity dimensions

H₂: There is heterogeneity of subgroups of a population sample accessing food assistance programs and their use of nutrition related coping strategies and tradeoffs and experience-based food insecurity dimensions.

H₀: There is no heterogeneity within population subgroups in their use of negative nutrition coping strategies and tradeoffs and experience-based food insecurity dimensions.

Variables gathered in the Sunshine State Hunger Survey (SSHS) and how they relate to experience-based food insecurity dimensions and the SEM were explored. This involved categorizing variables within the SEM at the individual, interpersonal, organizational, and public policy levels and exploring relationships to experienced based food insecurity domains. (Figure 13). The data were analyzed using two-step cluster analysis to explore relationships between selected variables.^{119–121} This study will explore how participants cluster into distinct groups by their use of negative nutrition coping strategies and tradeoffs and experience-based food - insecurity domains to view the population through a multidimensional lens.¹²² Two-step cluster analysis was used to explore emergent homogenous subgroups of the survey population based on select demographic characteristics such as age, age groups (early/middle/late adulthood), USDA HFSSM levels of very low, low, marginal, and high. Frequencies for select variables for the

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

homogenous subgroups were explored at the SEM level. Statistical analyses were performed using IBM SPSS Statistics 26 version 26 (IBM Corp. released 2019).¹²³

Figure 13 Social Ecological Model and Experienced-Based Food Insecurity Correlates

Social Ecological Model	Experience-based food insecurity domains	Variables	Level of Measurement	Type	Survey Question
		Negative nutrition coping strategies and tradeoffs			
Individual Level	Worry (HFSSM Q1)	Expired food	Nominal	Dichotomous	44-a
	Utilization (HFSSM Q3)	Damaged food	Nominal	Dichotomous	44-d
		Dilute food	Nominal	Dichotomous	44-g
		Eat less	Nominal	Dichotomous	44-h
		Demographics and socioeconomic household characteristics			
		Age, categories by life stage	Ordinal	Categorical (4 categories)	1
		Anxiety (GAD-7)	Scale	Categorical (3 categories)	35-41 42
		BMI Categories	Ordinal	Categorical (4 categories)	25 & 26
		Depression (WHO-5)	Scale	Continuous	30-34
		Education level	Ordinal	Categorical (6 categories)	5
		Employment status	Nominal	Categorical (5 categories)	15
		Gender	Nominal	Categorical (4 categories)	2
		Health - Disease	Nominal	Categorical (6 categories)	29
		Health - Perceived	Ordinal	Categorical (5 categories)	27
		Race	Nominal	Categorical (7 categories)	3
		Negative nutrition coping strategies and tradeoffs			
Interpersonal Level	Accessibility Domain (HFSSM Q4,5,6,7)	Buying cheap food	Nominal	Dichotomous	44-e
		Selling/pawing	Nominal	Dichotomous	44-c
		Splitting meals to eat later	Nominal	Dichotomous	43-b

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

		Medicine	Nominal	Dichotomous	43-a
		Demographics and socioeconomic household characteristics			
		Age groups in household	Categorical, Ordinal		9
		Housing type	Nominal	Categorical (6 categories)	11
		Marital status	Nominal	Categorical (4 categories)	8
		Number of people in household	Ordinal	Categorical (4 categories)	9
		Work status	Nominal	Categorical (6 categories)	15
		Negative nutrition coping strategies and tradeoffs			
Organizational Level	Availability Domain (HFSSM Q2,8,9)	Utilities	Nominal	Dichotomous	43-c
		Housing	Nominal	Dichotomous	43-d
		Transportation	Nominal	Dichotomous	43-e
		Education	Nominal	Dichotomous	43-f
		Demographics and socioeconomic household characteristics			
		Language spoken	Nominal	Categorical (3 categories)	4
		College student	Nominal	Dichotomous	6
		Military status	Nominal	Categorical (4 categories)	7
		Working food prep equipment	Nominal	Categorical (4 categories)	12
		Type of transportation	Nominal	Categorical (8 categories)	13
Public Policy Level	Stability Domain	Healthcare status	Nominal	Dichotomous	28
		Emergency food program use	Ordinal	Categorical (5 categories)	48
		Demographics and socioeconomic household characteristics			
		Participation in FA programs	Nominal	Dichotomous	45
		Types of FA participating in	Nominal	Categorical (8 categories)	46
		Time to SNAP running out	Ordinal	Categorical (5 categories)	47

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Limitations

The data collected in the SSHS was based on self-reported information therefore subject to a range of different biases. Self-reporting bias is a concern due to the survey nature of the data but does give a valuable perspective into respondent's behaviors without interviewer bias. The nature of hunger and food insecurity can include sensitive topics in households and social desirability bias is a limitation. Recall bias is a concern as survey questions asked about behaviors in the past 30 days. Though this was a relatively short amount of time it may not have captured the cyclic nature of the behaviors experienced throughout the food insecurity cycle over months.¹²⁴

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Chapter 4: Results

The purpose of this study was to examine use of negative nutrition coping strategies and tradeoffs at various perceived USDA HFSSM food insecurity levels among households accessing food relief and investigate how these behaviors relate to experience-based food insecurity dimensions and subpopulations at risk. Adults accessing food relief completed a survey at food assistance programs in two of the largest counties of Florida. The paper-based survey explored demographics, experiences, health, personal and economic circumstances of households accessing food relief. This study was unique in that it provided data on 1) the use of negative nutrition coping strategies and tradeoffs at different food insecurity levels and 2) the multidimensional determinants of food insecurity for subpopulations accessing food relief in the two largest counties in Florida.

Study Sample: Sunshine State Hunger Survey

The Sunshine State Hunger Survey (SSHS) provided a sample of 616 respondents collected from 18 food relief agencies across Tampa Bay tri-county area - including Hillsborough, Pasco and Pinellas and Jacksonville's Duval County between June to August 2018. Food Insecurity was determined using the 9-item U.S. Household Food Security Survey Module (HFSSM) for self-administration by children ages 12 and older.^{24,117} Survey responses with missing values are reported for each analysis. Demographic characteristics of the families surveyed based on the data set varied by surveys responses completed (See Table 1). Most households, 73.9%, identified as food insecure (very low 52.8% or low food security 21.1%), with 7% scoring as marginally food secure and 19.1% as food secure. Participants ages ranged from 18-100 years old, with an average age for survey respondents of 59.6 years. Survey

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

respondents were primarily female (female 62.6%, male 37.4%), Caucasian (42.8%) and African American (34.3%), with a high school diploma/GED or more 81.9% (high school diploma/GED 42.3%, trade school 7.0%, some college 20.1%, and bachelors or more 12.5%).

Table 1. Descriptive Analysis of the Sunshine State Hunger Survey

Variables	n	%
Level of Food Security (n=598, 18 missing)		
Very low food security	316	52.8%
Low food security	126	21.1%
Marginal food security	42	7.0%
Food security	114	19.1%
Gender (n=610, 6 missing)		
Male	228	37.4%
Female	382	62.6%
Race/Ethnicity (n=610,6 missing)		
White non-Hispanic	261	42.8%
African American	209	34.3%
Hispanic-White	113	18.5%
Other	27	4.4%
Highest Education Level (n=601, 15 missing)		
Less than high school	109	18.1%
High school diploma/GED	254	42.3%
Business, trade/technical license, certificate, degree beyond high school	42	7.0%
Some college beyond high school or a 2-year college degree	121	20.1%
Four-year college degree or higher	75	12.5%

Evaluation of the Sunshine State Hunger Survey (SSHS) data provided valuable information on the use of negative nutrition coping strategies and tradeoffs in a sample population actively accessing food relief. Survey participants provided responses to questions on the types of coping strategies they used to make food last longer. (Table 2) Additionally, households were asked about tradeoffs they might have to make between food and other items and how they make food last longer. Survey respondents reported that in the past 12 months they had to choose between paying for food and paying for other expenses including medicine or medical care, splitting meals/saving some of the meal to eat as a later meal, utilities, housing, transportation, and education. Crosstabulation procedure and chi square tests tested for

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

independence and investigated the relationship between USDA HFSSM food security level and negative nutrition coping strategies and tradeoffs. Due to small cell size, food secure and marginal food secure responses were combined. Associations were significant, using contingency coefficients for tables larger than 2x2, ($p < .05$), between all negative nutrition strategies and tradeoffs and USDA HFSSM food security levels except watering down food or drinks ($p = .112$). A total of 19/616 or 3.1% responses were missing, for an $n = 597$ of households responded to questions regarding coping strategies and tradeoffs and there was some slight variation on every item based on incomplete responses. Internal consistency and reliability of the negative nutrition coping strategies and tradeoffs scale was supported by a Kuder-Richardson 20 (KR-20) reliability analysis of ($\alpha = .81$) which is good.

Table 2. Use of Negative Nutrition Coping Strategies and Tradeoffs by USDA HFSSM Food Security Level

Variables	Food secure/ Marginal food security	Low food security	Very low food security	Total Yes Responses	Pearson Chi Square	<i>Contingency Coefficient</i>	<i>p</i>
Negative Nutrition Coping Strategies							
Purchasing inexpensive or unhealthy foods.	4.3% (6)	18.7% (26)	77.0% (107)	139	45.8	.290	<.001
Eating less so children or others have enough food.	2.2% (2)	14.6% (13)	83.1% (74)	89	38.8	.268	<.001
Eating food past expiration date.	7.2% (6)	16.9% (14)	75.9% (63)	83	19.7	.195	<.001
Purchasing food in dented or damaged packages.	3.7% (3)	24.4% (20)	72.0% (59)	82	20.0	.197	<.001
Watering down food or drinks.	9.5% (4)	23.8% (10)	66.7% (28)	42	4.38	.093	.112*
Selling or pawning personal property	9.8% (4)	9.8% (4)	80.5% (33)	41	11.8	.152	<.05

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Tradeoffs for food							
Trading off <i>utilities</i> for food.	5.8% (13)	17.9% (40)	76.3% (171)	224	95.4	.372	<.001
Trading off <i>transportation</i> for food.	4.9% (11)	18.8% (42)	76.3% (171)	224	100.2	.380	<.001
Splitting meals/saving some of the meal to eat as a later meal	5.6% (12)	15.5% (33)	78.9% (168)	213	98.2	.377	<.001
Trading off <i>housing</i> for food.	3.6% (7)	18.0% (35)	78.4% (152)	194	92.0	.366	<.001
Trading off <i>medicine or</i> <i>medical care</i> for food.	3.1% (6)	15.2% (29)	81.7% (156)	191	105.6	.388	<.001
Trading off <i>education</i> for food.	8.2% (9)	17.3% (19)	74.5% (82)	110	30.0	.223	<.001

*Association not statistically significant.

The descriptive statistics associated with use of negative nutrition coping strategies and tradeoffs across households accessing food assistance programs at different levels of perceived food insecurity as determined by the USDA HFSSM levels of very low, low marginal and high are reported in Table 3. A one-way analysis of variance (ANOVA) provided determination of statistically significant differences between food security status and the use of negative nutrition coping strategies and tradeoffs used by families accessing food relief. Games-Howell post hoc testing is used for unequal variances. Welch's test is used for violations of assumptions of homogeneity of variances. The one-way ANOVA test indicated that the effect of level of food security status on the frequency of use of negative nutrition coping strategies and tradeoffs is significant, ($F(2,483) = 102.4, p < .001$). Post hoc testing of between subject effects using Games-Howell, for unequal groups, showed a statistically significant difference between all food security groups, ($p < .05$), except between Food Secure and Marginal Food Secure participants, ($p = .313$) so those categories were combined for analysis

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Table 3. Descriptive Statistics for Frequency of Use of Negative Nutrition Coping Strategies and Tradeoffs at Different Levels of Perceived Food Insecurity

Variable	N	Mean # of Negative Nutrition Coping Strategies and Tradeoffs used	Std. Deviation
Food Secure/ Marginal Food Secure	107	0.61	1.34
Low Food Secure	114	2.47	2.47
Very Low Food Secure	265	4.45	2.71
Total	486	3.14	2.88

All measured HFSSM survey responses were recoded into experience-based food insecurity domains based on the sum of affirmative responses reported.¹¹⁸ The frequency of respondents' experiences within the domains of worry, utilization, access and availability are reported, and higher scores representing higher severity, like the FIE.^{92,99}

Table 4. Experience-Based Food Insecurity Domains Categorized from HFFSM Responses.

	N (mean)	0	1	2	3	4
Domain – Worry (HFFSM Q1)	578	186 (32.2%)	392 (67.8%)*			
Domain – Utilization (HFFSM Q3)	583	169 (29%)	414 (71%)*			
Domain – Access (HFFSM Q4,5,6,7)	567	158 (27.9%)	49 (8.6%)	35 (6.2%)	87 (15.3%)	238 (42%)*
Domain Availability (HFFSM Q2,8,9)	547	170 (31.1%)	138 (25.2%)	92 (16.8%)*		

*Indicates the higher the score the greater frequency and severity, total score varies by domain.

The Sunshine State Hunger Survey (SSHS) provided an opportunity to explore the characteristics of subpopulations of survey respondents, their coping strategies and tradeoffs and the multidimensional domains of experience-based food insecurity. A two-step cluster was used

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

to identify subgroups within the data (see Table 5). Two-step clustering is an exploratory procedure designed to reveal natural groupings (or clusters) within a dataset that would otherwise not be apparent.¹²⁵ Two-step clustering handles both nominal and categorical data based on the variable's nutrition coping strategies and tradeoffs (yes/no) and experience-based food security dimensions variables (yes/no). The demographic variables of age, adult life stage category and food security category were included due to their importance in previous research.^{6,81,83} Evaluation by age as a continuous variable, categorization by age into early adulthood ages 18-30 years, middle adulthood ages 31-60, and late adulthood ages 61+, as well as food insecurity status determined by the USDA HFSSM levels of very low, low marginal and high were used for evaluation of cluster data and not used in cluster creation to observe relationships between clusters and these variables.^{13,30} The two-step cluster analysis identifies data points that share similar values across a range of data identifying dense regions known as clusters.¹²⁵ This is done in a pre-clustering first step and a sub-clustering second step based on hierarchical agglomerative methods. Two-step cluster analysis then uses the log-likelihood measure for probability distribution of the variables. The Schwarz Bayesian Criteria was used to automatically determine the best clusters based on relative distance between clusters.^{125,126} Two-step cluster analysis revealed 3 clusters defined for 435 survey respondents, excluding 181 for incomplete data. Cluster distribution for Cluster 1, n=133, 30.6%; Cluster 2, n= 147, 33.8%, and Cluster 3, n=155, 35.6%. Tables can be interpreted by mean values within clusters. (See Tables 5 and Table 6).

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Table 5. Variable Cluster Distribution for Coping Strategies, Tradeoffs, and Experienced-Based Food Insecurity Dimension Variables.

		N	% of Combined	% of Total
Cluster	1	133	30.6%	21.6%
	2	147	33.8%	23.9%
	3	155	35.6%	25.2%
	Combined	435	100.0%	70.6%
Excluded Cases		181		29.4%
Total		616		100.0%

Table 6. Frequency of Variables by Cluster and Variables of Importance

Variables* Descending by importance of cluster membership	Cluster 1 Late adult, Worriers	Cluster 2 Middle adult, Traders	Cluster 3 Middle, Late adult Copers
Domain – Availability (HFSSM Q2,8,9) - enough food scores (0 low concern -3, high concern)	0.2	2.2	1.8
Domain – Access (HFSSM Q4,5,6,7) - no food scores (0, low concerns – 4, high concern)	0.6	3.4	3.1
Trading off <i>housing</i> for food. (% yes)	0.6%	88.1%	11.3%
Domain – Utilization (HFSSM Q3) – cheap food	2.8%	46.4%	50.9%
Trading off <i>transportation</i> for food. (% yes)	2.7%	76.0%	21.3%
Domain – Worry (HFSSM Q1)	6.7%	46.0%	47.3%
Trading off <i>utilities</i> for food.	5.0%	74.6%	20.4%
Trading off <i>education</i> for food.	3.1%	93.8%	3.1%
Trading off <i>medicine or medical</i> care for food.	1.9%	71.2%	26.9%
Splitting meals/saving some of meal to eat a later	4.7%	65.1%	30.2%
Eating less so children/others have enough food.	1.3%	57.7%	41.0%
Purchasing inexpensive or unhealthy foods.	11.6%	51.2%	37.2%
Receiving help from others, family/friends	13.2%	39.7%	47.1%
Selling or pawning personal property	8.1%	64.9%	27.0%
Growing food	5.0%	20.0%	75.0%
Eating food past expiration date.	14.1%	50.7%	35.2%
Purchasing food in dented or damaged packages.	12.5%	47.2%	40.3%
Watering down food or drinks.	13.2%	55.3%	31.6%
Factors			
Age (mean years)	67.5 (SD 22.3)	53.1 (SD 16.5)	53.3 (SD 18.6)
Age Category (early, middle, late adulthood) frequency	Late	Middle	Middle/Late
HFSSM Food Security Status - frequency (food secure, marginal, low, very low)	Secure	Very Low	Low/ Very Low

*n varies by cluster, responses reported by means

**Continuous variables reported as mean centroids for clustering.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Table 7. Frequency of Select SEM Variables by Cluster Membership

Variables*	Cluster 1 Late adult, Worriers	Cluster 2 Middle adult, Traders	Cluster 3 Middle, Late adult Copers
Employment status – out of work	10.6%	22.0%	12.8%
Households with children under 18 years	19.8%	40.6%	39.6%
Participation in FA programs	51.2%	61.5%	59.6%
Types of FA participating in SNAP	26.7%	35.2%	38.1%
School lunch program	9.3%	44.2%	46.5%
School breakfast program	1.2%	9.8%	7.0%
WIC	3.3%	6.7%	10.0%
Afterschool programs	3.3%	5.0%	1.5%
Backpack programs	0.3%	2.8%	0.9%
Meals on wheels	49.5%	19.8%	22.5%
Senior congregate	34.4%	18.8%	46.9%

The Sunshine State Hunger Survey (SSHS) was completed by 616 participants who visited 18 hunger relief agencies in two of the largest counties in Florida in 2018. Data from the Sunshine State Hunger Survey (SSHS) provides information from households who self-report as food insecure (73.8%), female (62.6%) and White non-Hispanic (42.8%) and African American (34.3%), Hispanic-White (18.4%) and Other (4.4%), ranging from 18 to 100 years old, and with a high school diploma (42.3%) or more (39.6%) education. There was a significant association ($p < .05$) between the use of negative nutrition coping strategies and tradeoffs and USDA HFSSM food security levels, except watering down food or drinks ($p = .112$). One-way ANOVA indicated a significant effect of level of food security status on the frequency of use of negative nutrition coping strategies and tradeoffs is significant, ($F(2,483) = 102.4, p < .001$). Post hoc testing showed a statistically significant difference between all food security groups, ($p < .05$), except between Food Secure and Marginal Food Secure participants, ($p = .313$) so those categories were combined for analysis. Additionally, the mean number of negative nutrition coping strategies and tradeoffs used increased with increasing food insecurity. The multidimensional experience-based food insecurity domains were categorized from HFSSM

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

responses and used as variables, with higher scores indicating greater frequency and severity, and total score varying by domain. Two-step cluster analysis found 3 distinct subgroups using coping strategies and tradeoffs and experience-based food insecurity domain variables. Age, age categories of early/middle/late adulthood, and USDA HFSSM status were used to observe relationships between clusters and these variables. These subgroups were: 1) late adult worriers, 2) middle adult traders, and 3) middle/late adult copers.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Chapter 5: Discussion

The first aim of this study was to examine use of negative nutrition coping strategies and tradeoffs at different perceived USDA HFSSM food insecurity levels among households accessing food relief and it was hypothesized that increased severity of food insecurity level would be associated with households' increased use of negative nutrition related coping strategies and tradeoffs impacting diet quality. There was a statistically significant effect ($p < .001$) of perceived food insecurity level and the frequency of use of negative nutrition coping strategies and tradeoffs. Based on the evidence, the null hypothesis was rejected.

The food security status was determined using the USDA HFSSM food insecurity survey questions within the Sunshine State Hunger Study (SSHS). Additionally, questions regarding the coping strategies and tradeoffs by households accessing food relief were used to identify the cushions participants use to prevent hunger and that may impact nutritional status negatively. Food secure and marginal food secure respondents used fewer negative nutrition coping strategies and tradeoffs (mean = 0.61), as compared low (mean = 2.47) and very low (4.45) food secure participants. No statistically significant difference was found between the food secure and marginally food secure ($p = .313$) for frequency of use of negative nutrition coping strategies and tradeoffs, so these categories were combined for analysis. The participants in the Sunshine State Hunger Survey (SSHS) used an average of 3.14 negative nutrition coping strategies and tradeoffs across all food insecurity status categories.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Households accessing food relief in the Sunshine State Hunger Survey (SSHS) used multiple negative nutrition coping strategies and tradeoffs and the results of this study describe these self-reported behaviors used to manage their food supply. Unique to our results is the data provides insight not only into the number of negative nutrition coping strategies and tradeoffs used, but also the frequency of their use in the food insecure population which is an important contribution to the literature.¹⁶ Most notably, Feeding America's HIA 2014 study¹³ found that 55% of households used more than three food extending coping strategies annually, however they were not stratified based on food security status. There is a gap in research on the use of coping strategies and tradeoffs at different levels of HFSSM status in the United States.¹⁶ This study is unique in that it found a relationship between the number of behavioral coping strategies and tradeoff use and food security status. The 12-item negative nutrition coping strategies and tradeoffs scale was found to be highly reliable ($\alpha = .81$). Post hoc testing showed a statistically significant difference in the number of different negative nutrition coping strategies and tradeoffs used between all food security groups, ($p < .05$). Interestingly, the SD between the different levels of food insecure households increased with increasing food insecurity status. This demonstrates greater variation in the number of negative nutrition coping strategies and tradeoffs between the food secure and low food secure levels and less variability between the lower levels of food security status (low and very low food secure). This can be expected, as food insecurity is cyclic in nature and coping strategies and tradeoffs influence the position in the cycle.^{58,69,85} As well, according to the USDA ERS definitions of food security, food secure and marginal food secure participants make up the food secure category and households measured as food secure may perceive less need to use food extending behaviors.⁵ In this study, with greater levels of food

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

insecurity, there were increases in how frequent households used the diverse negative nutrition behavioral hunger-coping strategies and tradeoffs.

Differently, the types of negative nutrition coping strategies and tradeoffs used by survey respondents provide insight into the frequency and relationships of these behaviors in managing the household food supply. Crosstabulation procedure and chi square tests were used to investigate the relationship between USDA HFSSM food security level six negative nutrition coping strategies and six tradeoffs for a total of twelve different measures (see Table 2). There was a significant association ($p < .001$) between all negative nutrition strategies and tradeoffs and USDA HFSSM food security levels, with the exception of watering down food or drinks ($p = .153$). The most frequently used negative nutrition coping strategies based on affirmative responses in descending order include purchasing inexpensive or unhealthy food ($n=139$), eating less so children or others have enough food ($n=89$), eating food past expiration date ($n=83$), purchasing food in dented or damaged packages ($n=82$), watering down food or drinks ($n=42$) and selling of pawning personal property ($n=41$). More frequently these behaviors are used in those households measured as very food insecure, with the exception of watering down food and drinks, which was not statistically different ($p = .153$) between food security categories. This is important, as watering down food and drinks is a food extending coping behavior that could be used early in the food insecurity cycle to make food last longer but directly reduces its nutrient value impacting nutritional status^{48,69} Research in the latest Feeding America Hunger Survey (2014)¹³ reported water down food and drinks as commonly used coping strategy. The most frequently used tradeoffs for food based on affirmative responses in descending order include trading off utilities ($n=224$), transportation ($n=224$), splitting meals/saving some of meals to eat at a later meal ($n=213$), housing (194), medicine (191) and education ($n=110$) for food. Overall,

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

the use of negative nutrition coping strategies and tradeoffs are significantly associated with levels of perceived food insecurity, with the more food insecure households engaging predominantly in these behaviors.

Similar findings in the literature suggest multidimensional behavioral coping strategies and tradeoffs are employed by individuals and households to reduce the negative impacts of hunger.^{13,16,45,55,58,69} Modifying foods to alter their nutritional value, reducing intake of total daily nutrients to conserve or extend food, and household tradeoffs used by people accessing food relief contribute to nutrition-related health status.^{51,66} The negative nutrition coping strategies and tradeoffs identified in this research are important findings as they may negatively impact nutritional status of individuals within households at multiple levels of food security status. Interesting, in this study in effort to cope with reduce food access participants reported most frequently purchasing inexpensive or unhealthy foods and eating less so children or others have enough food. Both of these behaviors directly impact nutrient quality of the diet negatively.^{16,69} Our results align with well documented research identifying food extending behaviors where parents sacrifice their own dietary and nutritional health so children have enough food.^{41,60,94} Additionally, respondents in our research self-reported trading off paying for utilities and transportation as the most frequent tradeoffs. Lack of utilities and transportation can negatively impact the ability to prepare, store and purchase nutritious food.^{55,69} The results are of practical significance since dietetics practitioners in clinical and community settings can inquire about rationing and hunger coping behaviors, as well as financial tradeoffs, via screening protocols and the Nutrition Care Process.^{48,51} Understanding negative nutrition coping behaviors and tradeoffs behaviors within a Social Ecological Model, as proposed, provides a reference for practitioners to consider not only individual change strategies but also how social and

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

environmental influences impact food and nutrient availability.^{96,101,102} This research can be used to understand behaviors and experiences of participants accessing food relief to design programs that influence the use of healthier nutrition coping strategies and provide resources for common food financial tradeoffs to exit the food insecurity cycle.

Food security status can be used to group households in terms of their ability to acquire nutritionally safe and adequate foods.⁸⁹ However, such a distinction does not account for variation within these categories across other factors such as those distinguished by the experience-based food insecurity dimensions (worry, utilization, access, availability).¹² The second aim of the current study was to explore the use negative nutrition coping strategies and tradeoffs used by households accessing food assistance programs and to include the multidimensional levels of experience-based food insecurity dimensions. It was hypothesized that homogenous subgroups of the study population would emerge through exploring the use of hunger-based coping strategies and tradeoffs and experience-based food insecurity dimensions. Additionally, negative nutrition coping strategies and tradeoffs and the multidimensional experienced-based food insecurity dimensions occur at varying levels of the SEM model, so understanding these relationships will help guide interventions. Variables were stratified by SEM levels prior to analysis based on the literature review to help describe the relationships between individuals and their environment. Exploratory analysis of population heterogeneity through a multidimensional view can be used to understand and identify behaviors and characteristics beyond the single classification of food insecurity status for households accessing food relief.

Two-step cluster analysis of the coping strategies and tradeoffs and experienced based food insecurity dimensions resulted in three homogenous cluster groupings. Cluster 1 used

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

coping strategies and tradeoffs less frequently, prioritized food extension behaviors and trading off bills, worried about food availability and had poor utilization of food (poor food quality/variety), were older and more frequently ended up in a food secure category. Cluster 2 experienced high concern with food access (unbalanced meals, eating less, cutting size, and skipping meals), were more likely to tradeoff basic household needs for food, in middle adulthood and identified as very low food secure. Cluster 3 prioritized coping strategies versus tradeoffs, with greater issues regarding access to food in middle/late adulthood and low/very low food secure. The most predominant predictors of importance between the clusters for each categorical variable grouping was the experience-based food insecurity domain of availability (running out of food, not eating for a whole day, and hunger), the predominant tradeoff was trading housing for food and the coping strategy was eating less so food would last longer.

The “late adult worriers” (cluster 1) emerged as a homogeneous subgroup based on their hunger coping behaviors. The most influential behavioral domains for this group were poor utilization of food (poor food quality/variety) and worrying whether food would run out. This group was the least less likely to use tradeoff behaviors for food, with trading off “paying for utilities” for food and “splitting meals/saving some of a meal to eat as a later meal” most common within the category. Both negative and positive coping strategies were used to a lesser extent than other groups, with “eating food past the expiration date”, “receiving help from family and friends”, “watering down food or drinks”, “purchasing food in dented or damaged packages”, and “purchasing inexpensive or unhealthy foods” more common. This group was the least likely to “sacrifice their own food, so children or others had enough food”, along with less frequently reported children under 18 in the household (19.8%). Demographics characteristics of this group were an older age ($M = 68.5$ years, $SD 22.3$), in the late adulthood category and food

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

secure. This group participated frequently in food assistance programs such as meals on wheels (49.5%), senior congregate meal programs (34.4%), and snap (26.7%), numbers for meals on wheels and senior congregate meal programs may be inflated since this may have been where surveys were completed. The results for the “late adult worriers” group are consistent with similar findings in older SNAP participants from Korlagunta et al.¹⁰² who report multidimensional levels of influence on lower income adult food behaviors. Andress’ research in 2017 similarly addressed dimensions of food access in the elderly against the SEM and experience-based food insecurity dimensions to determine how behaviors shape dietary practices and their relationships to food access.⁹⁶ The common behaviors in this group of employing food rationing strategies along with increased consumption of less nutrient dense foods are associated contributors to the exacerbation of chronic health conditions, poor health and functional decline in older adults.^{96,102,108} Interestingly, the “late adult worriers” group was more likely to be food secure while continuing lower levels of hunger and food coping strategies. This group showed less concerns about access to adequate food, and more frequently received Meals on Wheels and Congregate meals. These results are an important indicator of the role food relief agencies provide in helping households manage hunger. Research by Capsi, et al.¹²⁷ suggests that the understudied experience-based dimensions can better identify the local food environment and diet quality. Using these experiences of food relief agency participants provides data to help programs such as SNAP, congregate and home delivered meals, community gardens, senior centers, seniors farmers market programs and food relief agencies to continue to reduce the underlying factors contributing to vulnerability.^{63,84}

The “middle adult traders” (cluster 2) group more frequently reported that access to food (unbalanced meals, eating less, cutting size, and skipping meals) was the predominant

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

experience-based food insecurity dimension along with trading-off the fundamental necessities. The middle adult traders are the very low food insecure and reported high concern with food availability (unbalanced meals, eating less, cutting size, and skipping meals), frequently traded off housing, transportation, utilities, education, medicine for food, then splitting/saving meals for later. Concurrently, negative nutrition coping strategies aligning with reduced food access such as “eating food past the expiration date”, “selling/pawning personal property for food”, “buying inexpensive or unhealthy food”, “watering down food and drinks”, and “eating less so children or others have food” were increased. Demographics characteristic of this group include middle adulthood, with an average age of 53 years ($M = 53.1$ years, $SD 16.5$), and very low food secure. Coping with food insecurity from the SEM and experience-based food insecurity dimension approach in this cluster is important as the variables of priority align with organizational and interpersonal levels, similar to research by Peng et al.¹⁴ Social programs that reduce tradeoffs for essential factors for human livelihood such as housing, education, utilities, transportation and medicine provide opportunities to use financial resources towards nutritious food.^{60,97} This “middle adult trader” cluster was also more likely to eat less so children or others have enough food, where an adult sacrifices their nutrition for that of the child. This group reported 40.6% of the households had children under 18 years of age and were twice as likely as other groups to be out of work. Research by Bartfeld et al.⁶⁰ in households with children suggests that financial adaptations contribute to nutrition coping strategies such as adults reducing portions of foods or sacrificing their own nutrition needs to shield disruptions in food for children.^{40,54,60,61} Additionally, Dinour et al.⁵⁴ elucidated the negative nutrition consequences of poor food quality in adults, contributing to poor health and further increasing the burden of financial instability.⁵⁴ Hanson and Connor’s systematic review provides further evidence, concurrent with these results,

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

that parents compromise their own diet quality during food shortages to shield children from hunger.⁴⁰ Children often participate in managing food resources by participating in parenteral hunger coping strategies as reported by Fram⁷⁶, so interventions that support both the adults and children is essential. Interventions for this group of participants include firstly adequate food relief, as well as consistent access to nutritious food through government and not for profit programs, resources to reduce financial tradeoffs with improved financial stability in the household, expansion of SNAP benefits and other federal assistance programs targeting households with children, as well as educational resources on improving shopping, purchasing, cooking and improving the nutrient density of food consumption.^{109,128}

The middle/late adult copers group (cluster 3), more frequently identify with the experience-based food insecurity domain of access to food, managing this through negative nutrition coping behaviors, were more frequently in early and middle adulthood, and in the low to very low food security category status. Negative nutrition coping behaviors most frequently used include ‘eating food past expiration date’, “purchasing food in dented or damaged packages”, “purchasing inexpensive or unhealthy foods”, “watering down food or drinks”, “eating less so children or others have enough food”, and “splitting meals/savings some of a meal to eat at a later meal”. The subgroup more frequently uses positive coping strategies such as “growing food” and “receiving help from family and friends”. Demographics in this group reflect middle/late adults, 53.3 years old ($M = 53.3$, $SD = 18.6$ years), with low/very low food insecurity status. This group self-reports that 39.6% of households had children under 18 years of age. Across groups, hunger and food extending coping and tradeoff behaviors reflect the multidimensional cycle of behaviors proposed in the conceptual framework (figure 10) of a reciprocal pattern of influence on food security status. It appears in this analysis, that the

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

“copers” use less tradeoffs, perhaps as a response to different stress situations such as they were more likely to be working and extending money was prioritized over trading off money for food, with similar frequencies in participation in food assistance programs with a higher use of senior congregate meal programs. Literature on coping strategies by Kempson, et al.⁵⁹ aligns with our research to relate conceptual theories to behaviors. Categorization of behaviors and experiences through examining interrelationships and relating them to existing theoretical perspectives helps guide care and formulate recommendations.⁵⁹ Clearly, food insecurity literature identifies the use of coping strategies as a common way households acquire and manage food in effort to impact adequate food supplies and to prevent hunger.^{9,12,54,69} Nutrient quality in this subgroup does not appear to be a primary consideration and needs to be addressed through interventions from a SEM perspective.^{15,58,97} Continual use of food insecurity coping behaviors impact chronic disease prevention and management,³⁵ influence health care costs,³⁷ and impact the position of households in the cycle of food insecurity.⁹ Interventions for this group of participants should focus on messages of the impact of food quality on nutrition, extending healthy food, positive coping strategies such as growing food and help from family and friends, and increasing the food supply to prevent insufficient food intake.

Exploring the population heterogeneity of households accessing food relief provides a view into understanding “who” are the households and “what” hunger coping behaviors cluster together across the experience-based food insecurity domains. This research provides data on the nutrition and socioeconomic behaviors of respondents accessing food relief by describing how their hunger coping behaviors clustered within the socioecological model and experience-based hunger domains, beyond food security status. This multidimensional approach suggests a combination of interventions is required to best meet the needs of this varied population. It is

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

important to consider this approach because funding for programs is often based on food security status measurement levels, and the results of this survey show that not all populations groups accessing food relief score as “food insecure” using the USDA HFSSM potentially resulting in disproportionally under identification, underfunding and reduced programs and policies to support households in need. Updating screening tools to include behavioral dimensions of food security could be added to further identify those at risk. Dietitians in practice can use their food service and nutrition knowledge to advocate for additional financial support to meet unmet food needs and support food relief agencies and households to enhance the nutrient quality of foods provided. At the individual or household level, dietitians can provide recipes, as well as education and training on eating healthy on a budget, meal preparation, bulk food storage and food safety based on the home resources, and positive nutrition behavioral strategies to extend food in effort to support the use of foods received from food pantries. Understanding the types of negative nutrition coping behaviors and tradeoffs used predominately by these households can help dietitians predict behavioral impacts to nutritional status and disease self-management. Food relief agencies and dietitians can collaborate on creating nutrition specifications for the foods available at the food relief agency. As research by Peng, et al.¹⁴ suggests, applying the SEM to understand how different population characteristics influence coping behaviors and relate to their environment is a key component to the populations resilience. Equally important is the need for local, state and federal policies that provide opportunities to improve nutrition through increased access to wholesome, nutritious food to complement those that provide food access to reduce the negative nutrition coping strategies and tradeoffs used by households.¹²⁹ Programs at the local level such as prescriptions for produce from physicians to connect with community supported agriculture programs, farm to cafeteria initiatives, expanding nutrition and

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

food access education for health professionals, and creating community food councils are novel ideas to improve nutrition security. Policies that expand state, federal and charitable organizations efforts to provide quality nutritious foods and address financial hardships by connecting with social service agencies can modify negative nutrition behaviors and reduce worry.

Limitations

Strengths and weaknesses of the current research are important to consider. Convenience sampling provides both strengths and weaknesses, its ease of accessibility to the food insecure population was important, but its inherent lack of randomization may incur bias and limit generalizability to the larger food insecure population. The ease of accessibility to a completed survey data set, the fact that there is no cost to the current study, the reduce time to gather data on the topic, and the professionally designed and collected data by research experts in the field of food insecurity are strengths to the studies secondary data set. The cross-sectional research data obtained in the SSHS provides a more detailed perspective to the study's participants current experiences regarding food insecurity.⁹ Though, cross sectional data limits causal interpretation of the data, previous research on coping strategies use similar design due to the cyclic nature of food insecurity.^{16,58,97} Limitations exist as the data set provides no objective data, all data is self-reported and subjective in nature and may be difficult to generalize. Additionally, surveying respondents who are accessing food assistance programs in Florida and may not be generalizable to wider populations. Despite these limitations, the study is the first to explore the relationships between negative nutrition coping strategies, experience-based food insecurity domains and the Social Ecological Model.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Recommendations for Future Research

Food security status based on the USDA HFSSM is used to identify individuals and households who are food insecure. USDA HFSSM status may not always accurately classify individuals who experience the multidimensional nature of households and determinants of food insecurity.⁹¹ Although USDA HFSSM is easy to measure, there is conflicting literature as to its efficacy to improve population outcomes since rates have remained constant for several decades.⁶ Feeding America's quadrennial research¹³ tells us that food insecurity measures underestimate the multidimensionality of the experience of hunger. The World Health Organization (WHO) supports the use of the FAO dimensional experience scale because no single indicator accounts for all dimensions of food and nutrition security.⁹² Conceptual pathways, such as those proposed by Jones et al..¹⁰ should be further studied to see if experience-based food insecurity variables help to understand relationships across a continuum including barriers and influencers (see Figure 8). Households use of negative nutrition coping strategies and tradeoffs can be used to understand the impact on diet quality to advance food security and nutrition goals.¹²⁹ Future research should continue to explore whether population clusters exist when using other multidimensional measures of food insecurity to explore their validity.

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

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INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Appendices

Appendix A. Sunshine State Hunger Survey

Sunshine State Hunger Study Survey

Demographics

1. How old are you?
2. What is your gender?
 - a. Male
 - b. Female
 - c. Transgender
 - d. Other
3. What is your race/ ethnicity?
 - a. White non-Hispanic
 - b. African American non-Hispanic
 - c. Asian/Pacific Islander
 - d. Hispanic-White
 - e. Hispanic-non-White
 - f. American Indian/Alaskan Native
 - g. Other
4. Primary language spoken at home?
 - a. English
 - b. Spanish
 - c. Other
5. Highest education level achieved?
 - a. Less than high school
 - b. High school diploma
 - c. General equivalency diploma or GED
 - d. Business, trade, or technical license, certificate, or degree beyond high school
 - e. Some college beyond high school or a 2-year college degree
 - f. Four-year college degree or higher
6. Are you currently a college student?
 - a. Yes
 - b. No
7. Have you ever served in the military?
 - a. No
 - b. Currently serving
 - c. Served
 - d. Retired from the military
8. What is your marital status?
 - a. Married or living with a significant other
 - b. Never married (single)
 - c. Divorced

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

- d. Widowed
- 9. How many people in your household (including you) are:
 - a. Under the age of 18? _____
 - b. 18-55? _____
 - c. 55-64? _____
 - d. 65+? _____
- 10. What is your full address including apartment #, building #, etc:
- 11. Where do you live?
 - a. House or townhouse
 - b. Apartment
 - c. Mobile home or house trailer
 - d. Homeless
 - e. Other
 - f. Temporary housing (shelter)
- 12. Does your house have a working:
 - a. Stove, microwave or hot plate
 - b. Refrigeration
 - c. Yes but appliances not working because utilities turned off
- 13. How do you usually get here?
 - a. Drive own car
 - b. Use someone else's car
 - c. Someone else drives me
 - d. Bus
 - e. Walking
 - f. Taxi/Uber/Lyft
 - g. Bicycle
 - h. Other, specify
- 14. What's the main reason you visit this pantry over any other pantries in the area?
 - a. Close to home
 - b. Amount of food provided
 - c. Types of food provided
 - d. Customer experience
 - e. There is a limitation on the number of visits to other pantries
 - f. Other, specify
- 15. What is your current work status?
 - a. Work one job full-time and another job part-time
 - b. Work one job full-time
 - c. Work one job part-time
 - d. Work two or more jobs part-time
 - e. Currently out of work but actively looking in the last 4 weeks
 - f. Currently out of work
 - i. How long out of work?
 - 1. Less than 1 month
 - 2. 1-6 months
 - 3. 7-12 months
 - 4. More than 1 year

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

ii. Out of the work force because:

1. Retired
2. Disabled/poor health
3. Caretaker
4. Other

Food Security. The following questions are about the food situation in your home.

16. Do you **worry** that the food at home will run out before you have money to buy more?

- a. a lot
- b. sometimes
- c. never

17. Does the food that you buy **run out** and you don't have money to get more?

- a. a lot
- b. sometimes
- c. never

18. Do your meals only include a few kinds of **cheap foods** because you are running out of money to buy food?

- a. a lot
- b. sometimes
- c. never

19. How often are you not able to eat a **balanced meal** because you don't have enough money?

- a. a lot
- b. sometimes
- c. never

20. Do you have to **eat less** because you don't have enough money to buy food?

- a. a lot
- b. sometimes
- c. never

21. Do you **cut** the size of your meals because you don't have enough money for food?

- a. a lot
- b. sometimes
- c. never

22. Do you have to **skip a meal** because you don't have enough money for food?

- a. a lot
- b. sometimes
- c. never

23. Are you ever **hungry** but don't eat because you don't have enough food?

- a. a lot
- b. sometimes
- c. never

24. Do you not eat for a **whole day** because you don't have enough money for food?

- a. a lot
- b. sometimes
- c. never

Health. Now we would like to ask you a few questions about your health and well-being.

25. What is your height?

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

26. What is your weight? _____
27. How would you rate your overall health?
- a. Excellent
 - b. very good
 - c. good
 - d. fair
 - e. poor
28. Do you have healthcare?
- a. Medicare
 - b. Private insurance
 - c. Free/reduced health services
 - d. Military/VA insurance
 - e. Other: _____
 - f. No
29. Do you have any of the following health problems?
- a. Diabetes
 - b. High blood pressure
 - c. Heart disease
 - d. Lung disease
 - e. Cancer
 - f. Other: _____

Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Notice that higher numbers mean better well-being.

30. I have felt cheerful and in good spirits
- 5 - All of the time
 - 4 - Most of the time
 - 3 - More than half the time
 - 2 - Less than Half the time
 - 1 - Some of the time
 - 0 - At no time
31. I have felt calm and relaxed
- 5 - All of the time
 - 4 - Most of the time
 - 3 - More than half the time
 - 2 - Less than Half the time
 - 1 - Some of the time
 - 0 - At no time
32. I have felt active and vigorous
- 5 - All of the time
 - 4 - Most of the time
 - 3 - More than half the time
 - 2 - Less than Half the time
 - 1 - Some of the time
 - 0 - At no time
33. I wake up feeling fresh and rested
- 5 - All of the time

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

- 4 - Most of the time
- 3 - More than half the time
- 2 - Less than Half the time
- 1 - Some of the time
- 0 - At no time

34. My daily life has been filled with things that interest me

- 5 - All of the time
- 4 - Most of the time
- 3 - More than half the time
- 2 - Less than half the time
- 1 - Some of the time
- 0 - At no time

Over the last 2 weeks, how often have you been bothered by the following problems?

35. Feeling nervous, anxious, or on edge

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

36. Not being able to stop or control worrying

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

37. Worrying too much about different things

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

38. Trouble relaxing

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

39. Being so restless that it's hard to sit still

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

40. Becoming easily annoyed or irritable

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days
- 0 - Not at all

41. Feeling afraid as if something awful might happen

- 3 - Nearly every day
- 2 - More than half the days
- 1 - Several days

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

0 - Not at all

42. If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____

Somewhat difficult _____

Very difficult _____

Extremely difficult _____

Spending Tradeoffs. The next questions ask about tradeoffs you might have to make between food and other items and how you may make food last longer.

43. In the past 12 months, have you had to choose between paying for food and paying for other expenses including:

a. Medicine or medical care

i. If yes,

a) Every month

b) sometimes

b. Splitting meals/saving some of a meal to eat as a later meal

i. If yes,

c) Every month

d) sometimes

c. Utilities

i. If yes,

a) Every month

b) sometimes

d. Housing

i. If yes,

a) Every month

b) sometimes

e. Transportation

i. If yes,

a) Every month

b) sometimes

f. Education

i. If yes,

a) Every month

b) sometimes

44. What types of coping strategies do you use to make food last longer?

a. Eating food past expiration date

b. Growing food in a garden

c. Selling or pawning personal property

d. Purchasing food in dented or damaged packages

e. Purchasing inexpensive, unhealthy food

f. Receiving help from family or friends

g. Watering down food or drinks

h. Eating less so children or others have enough food

Food Assistance. The final questions are about programs and services to help with food.

45. Do you or anyone in your household participate in any food assistance programs?

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF
NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

- a. Yes
 - b. No
46. If yes, which program(s) have you or anyone in your household participated in:
- a. Supplemental Nutrition Assistance Program - SNAP (formerly known as food stamps)
 - b. Women, Infants, and Children (WIC)
 - c. Free or reduced-price school lunch programs
 - d. Free or reduced-price school breakfast programs
 - e. Afterschool snack or meal programs
 - f. Backpack weekend food programs
 - g. Meals on Wheels
 - h. Senior congregate meal program
47. If you are receiving SNAP, how long do the monthly benefits last until you run out of food?
- a. 1 week or less
 - b. 2 weeks
 - c. 3 weeks
 - d. 4 weeks
 - e. More the 4 weeks
48. How often do you use food banks, emergency kitchen or soup kitchen programs?
- a. Daily
 - b. Weekly
 - c. Monthly
 - d. 3-6 times a year
 - e. Less than 3 times a year

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

Appendix B. Institutional Review Board Approval



Attachment A - Study Details

Please note: This attachment is required for all submission packages involving research with human participants.

1. Participants

a. Number of Participants

How many participants will be enrolled? Please phrase your response as a range of participants required for your study including a minimum and maximum number required. Please differentiate between the anticipated number of participants you will contact for recruitment and the anticipated number of participants required for enrollment. For example, although you might recruit from an anticipated pool of 1000 individuals, only 150-200 participants are required for your study. If you are enrolling more than one population describe the anticipated total enrollment for each.

700-1000 participants

b. Participant Population(s)

Describe the participant population(s) including gender, ethnicity, and age range. If any population will be specifically targeted (e.g., UNF students, minors, prisoners, UNF employees) please state as such.

The target population for this study is food pantry participant adults, aged 18-70 years old. We anticipate the sample population will be approximately 50% African American, 30% Caucasian, and 20% Hispanic based on previous work conducted in food pantries in Jacksonville.

2. Justification of Sample Size/Data Analysis

Explain how the data will be analyzed or studied. In your response please indicate which statistical tests you anticipate use in your analyses if any. Describe how the proposed sample size is appropriate for achieving the anticipated results.

This is a descriptive study on food insecure clients. As such, demographic data will be reported as percentages. Based on a-priori sample size calculations, a minimum of 400 participants will detect a large effect size.

3. Study Background

Outline any background information that may be relevant to your study. For example, list the research questions you are attempting to answer with this study, indicate whether there has been other research on the topic of interest, and if other research has been conducted on this topic, describe any unexpected problems involving risk or adverse events that occurred with that research. Please include any relevant background details that may be relevant to your proposed study.

Access to nutritionally adequate and safe food is a basic human need and fundamental right. Yet, food insecurity, that is, a lack of consistent, dependable access to enough food for all household members for active, healthy living, continues to affect millions of households across the United States. Food insecurity rates spiked during the great recession (2008-2011) at 14.9 percent of households. Since 2011, food insecurity rates have slowly declined, with the greatest annual decline occurring from 2014 to 2015. In 2015, 15.8 million or 12.7 percent of all U.S. households, representing 42.3 million individuals experiencing food insecurity sometime during the year. Of all U.S. households, 7.7 percent (9.5 million households) experienced low food security, and 5.0 percent (6.3 million households) experienced very low food security. Within Duval County, 20.1% of residents are food insecure, a prevalence exceeding the national average. Households struggling with poverty experience food insecurity at greater rates than other households but income alone is not the sole factor that contributes to food security. Those who experience food insecurity at rates greater than the national average

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

include: 1) households with children, 2) households with children headed by a single female; 3) households headed by a Black non-Hispanic or Hispanic individual, 4) those living in rural areas, 5) those living in the south and southwest areas of the U.S., 5) families of enlisted service members and veterans, 6) college students, and 7) seniors.

Food insecurity is often an episodic, recurrent phenomenon. On average, a household remains food insecure for seven months out of the year. This results in times of the month and year when food is more readily available than others, but unfortunately, food availability may be cyclical and difficult to predict. This food instability is a distinct and under-studied aspect of food insecurity that underlies many of the coping strategies observed in food insecure households. Regardless of cause, individuals and households often deploy coping strategies, such as seeking calorically-dense and satiating foods that are often nutritionally inadequate. The subsequent risk factors and adaptive behaviors observed among many people struggling with food insecurity can help explain some of the associated health outcomes.

Food insecurity is a high priority for public health stakeholders, given its negative impact from both public health and economic perspectives. Consequences include physical impairments related to insufficient or inadequate dietary intakes, psychological issues related to a lack of consistent food access, and socio-familial disturbances. Across the life span, food insecurity often results in disrupted eating patterns that can lead to suboptimal nutritional status. These changes in dietary consumption contribute to negative physical and mental outcomes and an increased risk of disease. Among the food insecure, there is a higher prevalence of obesity than in the food secure population. In a 12-state study of 66,553 adults, those who were food insecure had 32 percent greater odds of being obese compared with those who were food secure. In addition to an increased prevalence of obesity in the food insecure, so too is a markedly higher rate of obesity-related diseases. The 2014 Hunger in America study conducted by Feeding America found that 58% of food pantry recipients had high blood pressure and 33% were diabetic. The concurrent prevalence of food insecurity and obesity among the food insecure is known as the hunger-obesity paradox. There are many factors that may contribute to the paradox, including inexpensive, high-calorie foods and limited access to healthy foods such as fruits and vegetables.

A variety of strategies are utilized by households when faced with fiscal resource constraints competing with food purchases. Robust safety net programs appear vital in bridging temporary fiscal gaps associated with short-term food insecurity often resulting from transitional periods during unemployment, illness, disabilities, or other unforeseen economic stressors. Federal food and nutrition assistance programs, along with community-based programs, have been developed and implemented to improve food security status. Several federal and non-federal programs address a variety of aspects of food insecurity. In addition to these programs, state and local food security and hunger centers, professional organizations, non-profit organizations, and foundations help support food insecurity-related program responses and research. Overall, a long-term, systematic, broad-based approach is required to effectively sustain vital economic social systems to prevent and alleviate food insecurity.

It is clear that food insecurity is a complex issue. Creating a community where everyone is healthy and food secure requires an intentional, collaborative approach from many stakeholders across the business, government and charitable sectors, universities and schools and community groups and residents. A collective impact approach can more effectively address broad systemic issues affecting food availability, affordability, accessibility, and quality. The first step in this approach is a comprehensive needs assessment.

This project proposes to conduct an assessment of the food insecurity issue in Jacksonville. The aim of the Hunger Study is as follows: 1) Conduct an assessment of food insecurity at the individual/household level in Duval County.

4. Study Design

Describe your study design (e.g., longitudinal, cross-sectional, mixed-methods) and type of data to be collected (e.g., archival/secondary data, public observation, survey, interview, focus group). In your response please also describe variables of interest for your research.

A cross-sectional survey designed will be used to answer the following research questions: 1) what is the prevalence of food insecurity among food pantry participants?; 2) what are the health issues experienced by food insecure adults?; 3) what are the coping strategies and tradeoffs used by food insecure adults?; and 4) what are the food assistance program and emergency food program used by food insecure adults? A convenience sampling of food pantry participants will be surveyed using a survey modified from the Feeding America Hunger Study that addresses demographics, food security level, health information, a validated anxiety/depression scale, and the

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

coping strategy index.

5. Study Procedures

Describe the proposed study procedures, including the sequence and timing of all activities. In your response please also describe the data collection setting (e.g., in person, one-on-one, small groups, large groups, electric/online) and location of data collection (e.g., research lab, place of participant choosing, controlled facility). If the research involves study of existing samples/records, describe how authorization to access samples/records will be obtained.

The research team will conduct surveys at food pantries and agencies throughout Jacksonville and Tampa. We will conduct surveys for one day at pantries/agencies. The dates will be determined by the pantries/agencies. Staff at the pantries/agencies will post a description of the study with the day the survey will take place. On the day of the survey, research staff will describe the study to clients and ask the client if they are willing to participate. Those individuals willing to participate will sign the informed consent form. Individuals will be repeatedly assured that participating or not participating in the survey will have no impact on their services at the pantry/agency. The surveys will be conducted privately with individuals who agree to participate in the survey. Study staff will go thru the questions with the client.

6. Study Materials

List all study materials (e.g., survey questions, interview questions, educational materials) that will or may be used in your study. It will be necessary to submit a copy of all study materials to the UNF IRB for review and approval. Please identify material by title and submit as an independent appendix document when possible. If you plan to utilize copyrighted information, permission from copyright owner may be necessary.

We will use a survey modified from the Feeding America Hunger Study that addresses demographics, food security level, health information, a validated anxiety/depression scale, and the coping strategy index.

7. Debriefing

If any form of deception is to be used, it will be necessary to justify your reasons for including that deception. In your response please describe your proposed debriefing procedures. It will also be necessary to submit a copy of debriefing materials that will be utilized. If you will not debrief participants, please state as such in the space below.

No deception will be used so no debriefing is planned as the survey does not contain deception or education.

8. Benefits, Compensation, and Risk

a. Participant Benefits

Describe anticipated benefits (e.g., health screening, increased knowledge as a result of an intervention) to research participants. If participants will not benefit directly, state so here.

No direct benefit is anticipated. Participants will contribute to the assessment of nutrition needs that will be used to develop nutrition programs in the future. The clients could foreseeable receive nutrition care thru the program in the future.

b. Societal Benefits

Describe anticipated benefits to society (e.g., added knowledge to the field of study) or a specific class of individuals (e.g., athletes or autistic children).

The results of the Hunger Study can be used to identify priority needs and gaps in services so that

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

a comprehensive programming can be implemented by the NEFFNH and Tampa Bay Network to End Hunger. The results can also be utilized to secure funding for the food assistance programs. Finally, the needs assessment will be instrumental in designing policies that can address food injustices identified in the Jacksonville and Tampa area.

c. Compensation

Describe compensation (e.g., extra credit toward course grade, reimbursement for travel expenses) to research participants. If participants will not be compensated, state so here. *Please note that monetary compensation may require collection of name, social security number, and address be reported to UNF controller's office.

No compensation will be provided to study participants.

d. Potential Risks to Participants

Describe the potential risks to participants and steps taken to minimize risks. Types of risks to consider include: physical, psychological, social, legal, employment, and financial.

There is no physical, psychological, social, legal or financial risks anticipated. The surveys will be conducted at the food pantry while clients are waiting to pick up food. Clients will be reassured that neither participating or deferring participation will not impact services received at the food pantry.

e. Potential Costs to Participants

Describe the potential costs to participants (e.g., invasion of privacy, time, travel) In your response please also outline how you will attempt to minimize potential costs to participants.

There are not potentials monetary, travel or privacy costs to participants. The only potential cost is the estimated 20 minutes to complete the survey but we will minimize this time by conducting surveys while they are waiting to pick up food.

f. Risk/Benefit Analysis

Describe the ratio of risks to benefits. Risks to research participants should be justified by the anticipated benefits to the participants, the researcher's discipline, or society.

Since minimal to no risks are involved, only benefits are anticipated by conducting this study.

9. Data and Safety Monitoring

a. Confidentiality

Describe procedures for protecting confidentiality of data collected and stored. Be sure to state whether any limits to confidentiality exist and identify any external agencies (e.g. study sponsor) that will have access to the data.

Surveys will be conducted with participants privately. The surveys are paper copies. No confidential information will be collected. The paper surveys will be stored in a locked file cabinet in the PI's office. No external agencies will have access to the data.

b. Data Storage, Security, and Monitoring

Describe your plan for securely storing any and all data. Be sure to identify where data will be stored, the security of this location, and how data will be monitored. **Any breach in data safety and all unexpected problems involving risk must be reported to UNF's IRB immediately (within 3 business days or as soon as practicable).*

No confidential information will be collected on the surveys. The paper surveys will be stored in a locked file cabinet in the PI's office. Any breach of data will be reported immediately to UNF's IRB. All survey data will be retained for a minimum of five years after the close of the study. Surveys will be destroyed by a paper shredder after a minimum of five years after the close of the study.

c. Safety Monitoring:

Describe your plan for monitoring your participants and identifying any adverse effects they may experience during and (if necessary) after data collection. **Any unexpected problems involving risk must be reported to UNF's IRB immediately (within 3 business days or as soon as practicable).*

We do not anticipate any adverse effects from completing the survey but participants will be monitored for any

INVESTIGATION OF THE MULTIDIMENSIONAL DETERMINANTS OF NUTRITIONALLY RISKY COPING STRATEGIES AND TRADEOFFS IN ADULTS

adverse effects. Participants will be provided the contact information of several crisis and help hotlines if they feel distressed while filling out the surveys.