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A developmental lens on food insecurity: the role of children in the household and age groups on food insecurity impacting mental health

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ABSTRACT

Objectives: The current study investigates the differential coping strategies and mental health consequences of food insecurity in relation to period of the lifespan (middle vs. late adulthood) and household composition (living with vs. without children).

Method: Using a cross-sectional design, food-related coping strategies, anxiety (GAD-7), and depression (WHO-5) were compared among the following groups: middle adults with vs. without children, and middle adults without children vs. late adults without children. Predictive models using hierarchical linear regression examined the main effects of age and household composition with food insecurity predicting mental health; additionally, the interaction of food insecurity with age and household composition was tested in a separate model.

Results: Middle-adults with and without children share similar frequencies in levels of food insecurity and coping strategies, which were significantly higher than late adults.

Conclusion: The link between food insecurity and depression was stronger for middle-adults without children than late adults. Food insecurity was a stronger predictor of anxiety for middle-adults with children than those without.

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Introduction

An extensive amount of literature within the disciplines of nutrition and public health addresses how food insecurity give rise to various health conditions; however, there is less research from a lifespan development perspective. The current study applies a developmental lens to food insecurity by comparing how inter-individual differences shape protective strategies for countering food insecurity and how food insecurity impacts mental health.

Food insecurity and mental health consequences

The complex experiences of food insecurity lie along a continuum divided into four categories: high food security, marginal food security, low food security, and very low food security (United States Department of Agriculture, 2019). High food security refers to households with no problems or anxieties accessing adequate food (National Research Council, 2006). Marginal food security is described as occasionally having problems or anxieties accessing adequate food, while still maintaining the quality, variety, and quantity of food intake. Low food security is characterized as households experiencing a reduction in quality, variety, and desirability of their diets with little to no indication of reduced food intake. Very low food security involves one or more members of the household experiencing disrupted eating patterns and reduced food intake due to lack of money or other resources.

Research consistently reports an association between increasing severity of food insecurity and higher frequencies of adverse mental health problems such as perceived stress, anxiety, depression, and suicidal ideation across the lifespan (Davison et al., 2015; Jessiman-Perreault & McIntyre, 2017). In a systematic review and meta-analysis of mental health conditions among a total sample of 169,433 food-insecure adults,

results across 57 studies indicate food insecurity is positively correlated with depression, anxiety/psychological distress, and sleep disorders (Arenas et al., 2019). A medium-to-large effect size has been established for food insecurity predicting anxiety and depression ($g_{\text{depression}} = 0.63$ and $g_{\text{anxiety}} = 0.50$) (Arenas et al., 2019). To put in context, the average food-insecure individual is expected to have a higher depression score than 75% of food-secure individuals and to have a higher anxiety score compared to 69% of food-secure individuals (Arenas et al., 2019). The current study will examine anxiety and depression associated with food insecurity as these mental health indicators share predisposing factors, interconnected mechanisms, and consistently have been related to food insecurity.

The relation between higher food insecurity and poorer mental health outcomes can be explained through the theories of social selection and social causation (Maxfield, 2020). Social selection postulates mental health increases the risk of poverty through reduced productivity, increased health expenses, and loss of employment/earnings (Lund et al., 2011). Conversely, social causation hypothesizes poverty increases the risk of mental illness through increased stress, malnutrition, trauma, and decreased social capital (Lund et al., 2011). Results from a study conducted by Tarasuk et al. (2013) support current literature stating that issues in mental health increases vulnerability to household food insecurity (Tarasuk et al., 2013). Furthermore, food insecurity compromises individuals' mental health and chronic health conditions leading to increased difficulties in managing self-care and accessing material support (such as financial means or resources for food) further perpetuating the experiences of food insecurity (Tarasuk et al., 2013). Whether from the social selection or social causation perspective, both explanations for the pathway between food insecurity and mental health would be expected to differ based on normative age-related changes, challenges, and resources.

Impact of food assistance programs on mental health

In the current study, all participants received food assistance benefits, which demonstrates that the current sample is representative of a population in need of access to food resources. Therefore, it is important to consider the influence of food assistance programs in relation to recipients' levels of food insecurity impacting mental health. In accordance with past and current research, Leung et al. (2015) reported that for every depressive symptom reported by participants, there was a dose-response relation in all depressive symptoms associated with increasing severity of food insecurity. Specifically, in a sample of individuals between 20 and 65 years, those who reported very low food security experienced worsened lethargy, trouble sleeping, and feelings of depression or hopelessness. Results indicated that participants classified as low or very low food secure who received SNAP benefits were associated with higher probability of depression than those not receiving SNAP (Leung et al., 2015). However, specifically among elderly populations, participation in food assistance programs modified the association between food insecurity and depression. Results demonstrate that food-insecure elderly participants receiving home-delivered meals reported a slight decrease in depression, which was measured by the 8-item version of the Center for Epidemiological Studies-Depression (CES-D) scale (Kim & Frongillo, 2007). Participation in food assistance programs serves as a social resource among older populations that may partly alleviate stressors, and therefore, mental health consequences, related to food insecurity. Considering both studies, the results in relation to one another highlight how food assistance programs contrast in its impact among differing age groups, further signifying the importance of examining the consequences of food insecurity across the lifespan.

Food insecurity across the lifespan: implications for coping and mental health consequences

If, why, and how food insecurity relates to mental health difficulties should be considered through patterns of gains (growth) and losses (decline) across the lifespan, which are influenced by age-graded (i.e. typical changes based on developmental age), history-graded (i.e. influential factors typical based on current events and societal norms), and nonnormative contextual factors (i.e. experiences faced by the minority of individuals that are not considered typical of development) (Baltes, 1987). Individuals' surrounding environment and biological functioning result in certain skills, demands, opportunities, and resources increasing and/or decreasing over time (Baltes, 1987). The combination of gains and losses must be examined in-tandem, as gains can offset certain losses so no change in functioning is evident. Therefore, it is important to investigate how the non-normative life event of food insecurity leads to differences in coping strategies and mental health outcomes among distinct developmental age groups of middle and late adulthood.

Middle-aged adults may engage in higher frequencies of compensation using food-related coping strategies, yet still experience worsened stress and anxiety. Patterns of midlife vulnerability may contribute to the susceptibility of increased stress resulting from food insecurity during middle adulthood. This period of the lifespan involves an increase in the number of social roles, such as work-related responsibilities and caring for children (Robinson et al., 2016). These social roles contribute to greater stress and financial worries, which are connected to

psychological well-being. Additionally, the onset of chronic disease and functional limitations typically occur during the period of middle adulthood. Low-income middle-aged adults are more likely to experience increased frequency and severity of health challenges, which can limit employment opportunities resulting in reduced opportunity for financial resources for food and further exacerbation of existing health complications (Miller et al., 2020). In this manner, age-specific influences on stress and coping should be considered to best identify unique risks and protective factors in food insecurity across the lifespan through this lens of a series of gains and losses. In order to investigate the role of age-specific influences within the context of food insecurity, the current study specifically identifies middle and late adulthood as these periods of the lifespan face similar challenges with food insecurity, yet may address such issues in contrasting manners based on age-related abilities.

Food insecurity in households with children: implications for coping and mental health consequences

Not only is period of the lifespan an important dimension to consider related to food insecurity, but it is imperative to also examine household composition in terms of children in the household. According to the USDA, households with children are at an increased risk of food insecurity (Coleman-Jensen et al., 2019). In 2018, households with children under the age of 18 experienced food insecurity at rates of 13.9%, which exceeded the national average. Parents and caregivers living in food-insecure households face the responsibilities of dividing limited resources among multiple family members and caring for the needs of their children while potentially having unmet basic nutritional needs of their own. Households with and without children are both faced with challenges within a food-insecure environment; however, perception of and protective strategies against food insecurity may manifest differently. Households with children were twice as likely to answer affirmatively to worrying food would run out as compared to households without children, suggesting households with children may be more prone to stress and anxiety stemming from food-related worries (Wilde, 2004).

Differential perception of and strategies towards combating food insecurity between households with and without children may impact that manner in which food insecurity relates to poorer mental health. Research consistently reports of food insecurity's detrimental effects on caregiver mental health resulting in poorer parenting practices that negatively influence children's physical and cognitive development (Fiese et al., 2011). In studies investigating food security in association with socioemotional factors among pregnant women and mothers, results indicated that higher food insecurity was related to higher perceived stress and was positively correlated to major depressive episodes and generalized anxiety disorder (Laraia et al., 2006; Whitaker et al., 2006). Results from both studies suggest food-insecure mothers are more likely to experience poorer mental health conditions compared to food-secure mothers, but there is less literature to evaluate the consequences of having children in a food insecure home as compared to living in a food insecure household without children.

Based on the family stress theory, the non-normative life event of poverty impacts family's resources to food both in quality and quantity; thus, parents/caregivers perceive their financial situation as a barrier in meeting their children's nutritional and dietary needs, which triggers an emotional crisis in parents'/caregivers' mental health (McCurdy et al., 2010; Price et al.,

2016). Furthermore, family crisis evokes new coping strategies in order to achieve balance between existing resources and the needs of all family members (Daneshpour, 2016). Households with children may engage in a greater variety or frequency of protective strategies against food insecurity, but still suffer the mental health consequences.

Current literature on food insecurity has only researched its impact on the different types of households and age groups independently of one another. The present study compares coping strategies and mental health outcomes of food insecurity between individuals in middle and late adulthood and for individuals in middle adulthood with and without children. The study hypothesized that rates of anxiety and depression symptoms and use of food-related coping strategies will be higher for adults in middle adulthood as compared to those in late adulthood and households with children in middle adulthood will have an increased risk for poorer mental health in both anxiety and depression than households without children as a result of food insecurity, but will engage in more protective strategies to increase their food availability. The present study builds towards a more accurate understanding of how food-related coping strategies and mental health implications manifest differently in accordance with contextual factors of the lifespan.

Method

Participants

The Sunshine State Hunger Study consisted of individuals receiving services from food pantries and food assistance programs throughout Jacksonville and Tampa, Florida. The full sample of participants from the original study consisted of individuals ranging between 18 and 98 years of age. Individuals in late adolescence, early adulthood, and late adulthood living with children were excluded based on the research questions of interest. In the current study, participants ($n=366$;

$M=64.63$ -year old; $SD=15.73$) were categorized into the following groups: middle-adults with children ($n=61$; $M=46.51$ yrs.; $SD=7.15$), middle-adults without children ($n=89$; $M=50.62$ yrs.; $SD=6.39$), and late-adults without children ($n=216$; $M=75.53$ yrs.; $SD=9.76$). Middle adulthood was classified as between the ages of 30 and 60, and late adulthood was classified as over the age of 60. Participants were excluded from analysis if they identified they had no children in the home but answered affirmatively to receiving a service that requires children. Similarly, participants who reported being under 60 were excluded if they reported receiving a senior-focused service such as Meals on Wheels. Table 1 presents demographic characteristics for the sample and the three groups of interest.

Procedures

Participants were asked to complete a survey with questions about health and well-being as well as their behaviors and experiences with food. The survey was administered face-to-face with clients at food pantries and food assistance programs, which consisted of the following sections: Demographics, Food Security, Health and Well-Being, WHO-5 Well-Being Index (World Health Organization, 1998), GAD-7 Item Survey (Spitzer et al., 2006), Spending Tradeoffs, and Food Assistance. Surveyors were trained by the principal investigator and included public health and nutrition students and employees from the non-profit organizations where the survey was administered. Responses were recorded on paper surveys and entered by a research assistant.

Measurements

Food insecurity

Food insecurity was established via the USDA Self-Administered Food Security Survey Module for Children Ages 12 Years and Older (Connell et al., 2004), which was adapted from 12 survey

Table 1. Demographic information for families receiving services to combat food insecurity for entire sample and subgroups based on age and children living in the home.

	Full sample $n=366$ (%)	Middle-adult with children ($n=61$)	Middle-adult without children ($n=89$)	Late-adult without children ($n=216$)
Female	228 (62.3%)	44 (19.3%)	54 (23.7%)	130 (57.0%)
Race/Ethnicity				
Location				
Jacksonville	55 (15.0%)	15 (27.3%)	16 (29.1%)	24 (43.6%)
Tampa	311 (85.0%)	46 (14.8%)	73 (23.5%)	192 (61.7%)
Gender				
Male	134 (36.6%)	17 (12.7%)	34 (25.4%)	83 (61.9%)
White	167 (45.6%)	20 (12.0%)	46 (27.5%)	101 (60.5%)
Black/African American	105 (28.7%)	23 (21.9%)	28 (26.7%)	54 (51.4%)
Hispanic	75 (20.5%)	12 (16%)	11 (14.7%)	52 (69.3%)
Other	15 (4.1%)	4 (26.7%)	3 (20.0%)	8 (53.3%)
Marital Status				
Married	78 (21.3%)	20 (25.6%)	19 (24.4%)	39 (50.0%)
Never Married	83 (22.7%)	18 (21.7%)	34 (41.0%)	31 (37.3%)
Divorced	117 (32.0%)	18 (15.4%)	29 (24.8%)	70 (59.8%)
Widowed	82 (22.4%)	5 (6.1%)	5 (6.1%)	72 (87.8%)
Education				
Less than High School	63 (17.2%)	9 (14.8%)	15 (16.9%)	39 (18.1%)
High School/GED	134 (36.6%)	25 (41.0%)	36 (40.4%)	73 (33.8%)
Business/Trade School	31 (8.5%)	9 (14.8%)	8 (9.0%)	14 (6.5%)
Some College/College Degree or Higher	131 (36.0%)	17 (13.0%)	28 (21.4%)	86 (61.8%)
Employment Status				
Full Time Work	33 (9.0%)	11(33.3%)	18 (54.5%)	4 (12.1%)
Part Time Work	23(6.3%)	11(47.8%)	5 (21.7%)	7 (8.7%)
Out of Work	108 (29.5%)	23 (21.3%)	32 (29.6%)	53 (49.1%)

Notes: Gender and Ethnicity were similar across the subgroups examined, but statistically significant differences existed between middle-adults with children, middle-adults without children, and late-adults for the other demographic factors (location, marital status, education, and ethnicity).

items from the original US Food Security Survey Module (United States Department of Agriculture, 2019). The current study utilizes the children's adapted version to enhance the measurement's readability among participants when considering that the average American has a seventh-eighth grade reading level (Calderón et al., 2006). Furthermore, the majority of participants from the current study are at risk of poverty and/or are over the age of 65, which are some main characteristics of those who over-represent Americans with very limited reading skills. Therefore, in order to increase the likelihood of reliable and complete responses, the current study utilizes the USDA Self-Administered Food Security Survey Module for Children Ages 12 Years and Older to more accurately measure food insecurity in consideration of varying reading levels. This survey consists of 9-items regarding frequency (A Lot, Sometimes, Never) of having certain food-related experiences at home related to worrying about food insecurity and the quality and quantity of food available (see Table 2). To calculate a sum-score for food insecurity, responses of 'A lot' and 'Sometimes' were coded as affirmative with a numerical value of 1. The sum of affirmative responses was calculated to determine the respondents' raw scores. Raw scores of 0 indicate very low food insecurity, 1

indicate low food insecurity, 2–5 indicate marginal food insecurity, and 6–9 indicate high food insecurity.

In addition, the current study explores experienced-based food insecurity using the domains of worry, availability, utilization, and access. According to Jones et al. (2013), the domain of worry was the most prevalent domain reported across several countries. Furthermore, the definition of food insecurity encompasses the domains of availability, utilization, and access as all three provide a conceptual pathway linking various factors that contribute to food insecurity (Food and Agriculture Organization, 1996). In regard to the current study, a general food insecurity sum score (where higher scores indicate greater food insecurity) and the average of the items within domains of food insecurity, worry, access, utilization, and availability, were scored such that higher scores indicated greater food security (1 = a lot; 2 = sometimes; 3 = never) (Jones et al., 2013). Participants were also asked about ways in which they coped with food insecurity, if they engaged in spending trade-offs related to food, and the types of food assistance programs received (see Table 3). Coping strategies were considered to be protective against food insecurity, although they could be detrimental to nutrient intake (i.e. 'eating expired food' or 'watering down food').

Table 2. Correlation matrix and descriptive statistics for health rating, depression, and anxiety in relation to food insecurity total score for middle adult households with children, middle adult households without children, and late adulthood.

	Food insecurity total	Health rating	Education	Food seeking strategy sum score	WHO-5	GAD-7
Full sample (n = 366)	4.97 (3.45)	.166**	-.089	.463**	.267**	.422**
Middle adult parents (n = 68)	7.04 (2.15)	3.40 (1.06)	2.58 (1.09)	1.95 (1.47)	10.84 (6.72)	9.74 (7.26)
Middle adult non-parents (n = 91)	6.80 (2.80)	3.33 (1.07)	2.66 (1.27)	1.62 (1.45)	12.20 (6.25)	10.43 (6.34)
Late adulthood (n = 212)	3.66 (3.41)	3.39 (1.04)	2.88 (1.43)	1.31 (1.31)	10.48 (6.13)	5.86 (5.56)
Moderate food insecure	2.53 (1.15)	3.28 (1.07)	2.72 (1.23)	.97 (1.18)	9.44 (6.48)	5.48 (5.26)
High food insecure	7.92 (1.10)	3.56 (.99)	2.66 (1.32)	1.88 (1.54)	12.63 (5.96)	10.26 (6.34)
		-.056	.186*	.063	.128	.221**

Note. ** < .01; * < .05; Means, Standard Deviations (in parentheses), and Pearson's Correlation Coefficients are presented. Health ratings of 3 was rated as 'good', so scores higher than 3 indicate that, on average, members of that group were having health complications.

Table 3. Rank ordering of food insecurity items based on prevalence of affirmative answers for individuals in middle adulthood with children, middle adulthood without children, and late adulthood without children (n = 366).

	Middle adulthood with children			Middle adulthood without children			Late adulthood without children		
	A lot	Some times	Never	A lot	Some times	Never	A lot	Some times	Never
Worry about food access	<i>M</i> = 1.54; <i>SD</i> = .62			<i>M</i> = 1.76; <i>SD</i> = .75			<i>M</i> = 2.35; <i>SD</i> = .70		
Do you worry that the food at home will run out before you have money to buy more?	52.5%	41.0%	6.6%	42.7%	38.2%	19.1%	12.0%	37.5%	45.8%
Utilization ($\alpha = .815$)	<i>M</i> = 1.62; <i>SD</i> = .55			<i>M</i> = 1.72; <i>SD</i> = .64			<i>M</i> = 2.35; <i>SD</i> = .66		
Do your meals only include a few kinds of cheap foods because you are running out of money to buy food?	44.3%	41.0%	9.8%	37.1%	40.4%	15.7%	8.3%	35.6%	49.5%
How often are you not able to eat a balanced meal because you don't have enough money?	44.3%	39.3%	14.8%	40.4%	41.6%	18.0%	13.0%	33.8%	50.0%
Availability ($\alpha = .813$)	<i>M</i> = 2.01; <i>SD</i> = .62			<i>M</i> = 2.12; <i>SD</i> = .61			<i>M</i> = 2.63; <i>SD</i> = .46		
Does the food that you buy run out and you don't have money to get more?	50.8%	42.6%	4.9%	44.9%	42.7%	12.4%	14.8%	37.5%	42.6%
Are you ever hungry but don't eat because you don't have enough food?	29.5%	34.4%	34.4%	21.3%	40.4%	38.2%	3.2%	24.5%	68.5%
Do you not eat for a whole day because you don't have enough money for food?	16.4%	34.4%	49.2%	13.5%	33.7%	52.8%	0.9%	17.6%	77.8%
Access ($\alpha = .91$)	<i>M</i> = 1.85; <i>SD</i> = .66			<i>M</i> = 1.93; <i>SD</i> = .64			<i>M</i> = 2.50; <i>SD</i> = .59		
Do you have to eat less because you don't have enough money to buy food?	45.9%	37.7%	14.8%	31.5%	47.2%	20.2%	10.6%	34.3%	52.3%
Do you cut the size of your meals because you don't have enough money for food?	34.4%	49.2%	16.4%	33.7%	49.4%	16.9%	7.4%	36.6%	52.3%
Do you have to skip a meal because you don't have enough money for food?	31.1%	34.4%	34.4%	23.6%	43.8%	30.3%	6.9%	24.5%	65.3%

Note. Due to the scoring of items, higher scores on the domain averages indicate less food insecurity within that domain. Averages around 2 would indicate that participants, on average, were answering 'sometimes'.

Health rating status

The current study asks participants to self-rate their overall health status as excellent (5), very good (4), good (3), fair (2), or poor (1). Utilizing a self-reported health status provides a simple and direct measure of respondents' perceptions of their health that allows for a broad and comprehensive rating as interpreted by the individual (Idler & Benyamini, 1997; Krause & Jay, 1994). The subjectivity of self-reported health rating provides external observers with insight into how individuals perceive their overall health that is representative of the biological, psychological, and social dimensions of health. Self-reported health status possesses high validity and has demonstrated to be a strong predictor between perceived health and future mortality in middle-aged and late adulthood populations (Miilunpalo et al., 1997). Poor ratings of one's health status can be reflective of the absence of resources that influence health and can be indicative of decreased engagement in preventative practices or self-care that contribute to good health (Idler & Benyamini, 1997). In relation to the current study, self-reported health ratings can be associated with participants' physical and mental health as well as levels of food insecurity and coping strategies and is an appropriate covariate to control for when examining mental health outcomes based on food insecurity.

WHO-5 Well-Being Index

The WHO-5 Well-Being Index is a questionnaire that assesses current mental well-being using a 6-point scale (World Health Organization, 1998). With application across different areas of studies among a wide array of participant demographics, the WHO-5 has demonstrated to have high clinical validity, responsiveness/sensitivity, and potential use as a screening tool for depression (Topp et al., 2015). Respondents indicate how often they relate to the five positive statements in the questionnaire. Answers range from 'All of the time', 'Most of the time', 'More than half of the time', 'Less than half of the time', 'Some of the time', and 'At no time' and are, respectively, assigned numerical scores of 5, 4, 3, 2, 1, and 0. Scores are calculated by totaling the figures of the five answers with 0 representing worst possible and 25 representing the best possible quality of life; for the current study, scores were reversed so higher scores were indicative of greater prevalence of depressive symptomatology. With reversed scores, a total sum greater than 12 or if a participant answered 'All of the time' and 'Most of the time' on any one item indicated impaired well-being and in a clinical setting would be considered a positive screen for someone in need of a diagnostic interview (Halliday et al., 2017). In the current sample, middle-adult households without children demonstrated the highest prevalence of depressive symptomatology that would suggest they need further evaluation for depression ($n = 46\%$), followed by middle-adult households with children (42.4%) and late-adults (34.1%).

Generalized anxiety disorder 7 item scale

The GAD-7 is a tool used to screen and assess the severity of anxiety-related symptoms. Respondents rate the frequency of experiencing seven anxiety symptoms within the last two weeks (Spitzer et al., 2006). Numerical values of 0, 1, 2, and 3 were respectively assigned to 'Not at all', 'Several days', 'More than half the days', and 'Nearly every day'. Scores of 0–4 represent minimal anxiety, 5–9 represent mild anxiety, 10–14

represent moderate anxiety, and 15–21 represent severe anxiety. In the current sample, 42.1% middle-adult households with children, 49.4% middle-adult households without children, and 20.0% of late-adults reported anxiety levels which would be considered moderate or severe. The GAD-7 has a sensitivity of 89% and a specificity of 82% as a screening tool for Generalized Anxiety Disorder using a threshold of 10. It is recommended that scores greater than 10 require further evaluation.

Analytic strategy

Analyses were conducted using SPSS software (version 25) (IBM Corp, 2017). To allow for meaningful interpretation, comparisons were made between middle-adults with and without children and middle- and late-adults without children. There were very few individuals in late adulthood who reported children in the household, and it was assumed these would have been inter-generational households, so late-adults with children were not examined. First, chi-square analysis were conducted to examine if there were group differences when examining the frequency by which individuals answered 'a lot, sometimes, and never' for individual items; one-way ANOVAs examined difference across groups when considering the average score for items within four domains of food insecurity (i.e. worry, utilization, availability, and access) (Jones et al., 2013). Next, the groups were compared in the manner in which they tried to cope with food insecurity by examining differences in the prevalence of types of protective coping strategies and utilization of food assistance programs using a chi-square analysis. Finally, predictive models using hierarchical linear regression examined the main effects of age (dichotomized variable: middle vs. late adulthood) and household composition (dichotomized variable: with or without children) and food insecurity (continuous variable) predicting anxiety and depression (continuous variables), along with the interaction of food insecurity with age and childhood status (tested in separate models). These models employed Andrew Hayes' PROCESS macro for a single moderating variable (model 1) (Hayes, 2018), which allowed for the inclusion of a bootstrapped 95% confidence interval around the unstandardized model coefficients and provides a plot of the interaction for ease of clinical interpretation (e.g. when moderating groups met thresholds of concern for depression and anxiety). Listwise deletion was used for the four predictive models examined, but missing data was examined to ensure the missing at random assumption was plausible (Enders, 2010). Missing data ranged from 73% (model 2) to 95% (model 4); when examining demographic characteristics, there were no meaningful and significant differences between those included and those excluded based on gender, marital status, education, work status. Furthermore, those excluded from the models did not differ from those included based on variables within the predictive model (food insecurity, anxiety, depression, and self-reported health).

Table 2 presents descriptive statistics and a correlation matrix for variables of interest. Adjustments were made for self-reported health status, (continuous variable) as this was positively correlated with our dependent variables; education was hypothesized to be a potential model covariate but was not found to be related to our dependent variables. The assumptions of linearity, homoscedasticity, and homogeneity of variance were examined and deemed acceptable (Tabachnick & Fidell, 2012). Effect sizes are reported as Cohen's f^2 by

examining the effect size attributable to the main effect and interaction beyond the relation between self-reported health and the dependent variables related to mental health (Cohen, 1988; Selya et al., 2012); Cohen's f^2 can be interpreted as small ($f^2 > .02$), medium $f^2 > .15$, and large ($f^2 > .35$).

Results

Table 3 presents the differences in responses to food insecurity items by age group and household composition. Late-adults without children in their household had significantly higher averages across each food insecurity domain, which indicated that they encountered each food insecurity domain less than middle-adults with or without children ($F_{\text{worry}}(2, 355) = 43.08; p < .001$; $F_{\text{availability}}(2, 361) = 49.78; p < .001$; ($F_{\text{utilization}}(2, 359) = 47.80; p < .001$; $F_{\text{access}}(2, 359) = 41.97; p < .001$). On average, late-adults were more likely to answer between 'sometimes' to 'never' while middle-adults averaged between 'a lot' and 'sometimes'. Regardless of group membership, participants were less likely

to report difficulties with availability as compared to worry, utilization, and access.

Table 4 provides the frequency by which individuals in the three subgroups were engaging in coping or protective strategies related to food access and availability. Individuals in middle adulthood, both with and without children, were more likely to receive food assistance through SNAP and report spending trade-offs in splitting meals, medicine, utilities, housing, transportation, and education ($p < .001$) than late-adults. Individuals in late adulthood were less likely to report they purchased damaged or inexpensive food, bought inexpensive food, or ate less. Households with children are more likely to eat less to make food last longer and were slightly higher in eating expired food as compared to households without children.

Table 5 provides the results from the predictive models. For the comparison of middle and late-adults without children, food insecurity was a significant predictor of both depression ($R^2 = .275, F(4, 300) = 28.49, p < .0001$) and anxiety ($R^2 = .231, F(4, 178) = 13.374, p < .001$) regardless of age group; however, the

Table 4. Protective strategies for minimizing the impact of food insecurity.

	Full sample $n = 366$	Middle-adult with children	Middle-adult without children	Late adult without children
Making food last longer				
Eating expired food**	58 (15.8%)	14 (23.0%)	13 (14.6%)	31 (14.4%)
Growing food	15 (4.1%)	2 (3.3%)	5 (5.6%)	8 (3.7%)
Selling or pawning items to buy food+	24 (6.6%)	5 (8.2%)	11 (12.4%)	8 (3.7%)
Purchasing damaged food**	58 (15.8%)	18 (29.5%)	21 (23.6%)	19 (8.8%)
Buying inexpensive food*	85 (23.2%)	19 (31.1%)	32 (36.0%)	34 (15.7%)
Receiving help from family to buy food+	94 (25.7%)	21 (34.4%)	32 (36.0%)	41 (19.0%)
Watering down food	27 (7.4%)	8 (13.1%)	6 (6.7%)	13 (6.0%)
Eating less	48 (13.1%)	30 (49.2%)	14 (15.7%)	4 (1.9%)
Spending trade-offs				
Splitting meals**	139 (38.3%)	30 (49.2%)	47 (53.4%)	62 (29.0%)
Medicine**	119 (32.5%)	32 (52.5%)	40 (46.0%)	47 (21.8%)
Utilities**	143 (39.3%)	36 (59.0%)	42 (48.3%)	65 (30.1%)
Housing**	123 (33.8%)	33 (54.1%)	42 (48.3%)	48 (22.2%)
Transportation**	140 (38.6%)	36 (59.0%)	45 (51.7%)	59 (27.4%)
Education**	67 (18.6%)	20 (32.8%)	28 (32.6%)	19 (8.9%)
Food assistance programs				
SNAP+	128 (35.0%)	29 (54.7%)	37 (41.6%)	62 (28.7%)
WIC	4 (1.1%)	4 (6.6%)	0	0
Breakfast or Lunch program	27 (7.4%)	26 (42.6%)	1 (1.1%)	0
Afterschool or Backpack program	5 (1.4%)	5 (8.2%)	0	0
Meals on Wheels	91 (24.9%)	3 (4.9%)	6 (6.7%)	82 (38.0%)
Senior Congregate	47 (12.8%)	1 (1.6%)	3 (3.4%)	43 (19.9%)

Note: Chi-square analysis were examined for groups with cells containing at least 5 participants.

+ = $p < .05$; * $p < .01$; ** $p < .001$.

Table 5. Moderation analysis: comparing middle adulthood to late adulthood without children and middle adults with and without children on food insecurity predicting anxiety and depression.

	Middle vs. Late adulthood				
	B	SE	t	p	95% CI
Model 1: Depression ($n = 301$)					
Food insecurity	.681	.208	3.27	.001	.272, 1.09
Middle vs. late adult	2.42	1.58	1.52	.128	-.703, 5.53
Interaction	-.536	.233	-2.31	.022	-.994, -.076
Model 2: Anxiety ($n = 273$)					
Food insecurity	.669	.230	2.91	.001	.217, 1.12
Middle vs. late adult	-1.19	1.75	-.681	.496	-4.64, 2.26
Interaction	-.288	.257	-1.12	.262	-.794, .217
Children vs. childless household					
Model 3: Depression ($n = 167$)					
Food insecurity	.791	.243	3.26	.001	.312, 1.27
Child vs. childless home	2.05	2.32	.887	.376	-2.518, 6.627
Interaction	-.103	.325	-.317	.751	-.744, .538
Model 4: Anxiety ($n = 183$)					
Food insecurity	1.080	.246	-1.669	.000	.593, 1.567
Child vs. childless home	3.484	2.374	4.38	.144	-1.200, 8.169
Interaction	-.320	.331	.335	.335	-.973, .334

Note. Individual self-report on quality of health was controlled for in each model. The process macro produces an unstandardized beta, which is the slope of the line.

interaction of age group and food insecurity was significant for the model predicting depression. Due to the significant interaction, conditional effects of were examined and revealed significant for the model examining food insecurity and depression for middle-adults ($B = .681, p < .01$), but not late-adults ($B = .14, p = .18$). Higher levels of food insecurity were more consequential on depressive symptomatology for those in middle adulthood. For every additional item answered affirmatively for food insecurity, the middle-adult's level of depression increases by .68 points while late-adults increase in depression was only .14 points for one more affirmative food insecurity item. The effect of food insecurity, age group, and the interaction of the two on depression represented a large effect size (Cohen's $f^2 = .38$). To put in clinical terms, when controlling for self-reported health-quality, the average middle-adult met a threshold of concern for depression when they answered affirmatively to seven out of nine food insecurity questions (i.e. high food insecurity) for depression (WHO > 12) while the average late-adult never met a threshold of concern. Similarly, for anxiety (GAD > 10), middle adults met threshold for concern when answering affirmatively to seven out of nine questions while the average late adults did not reach threshold for concern in anxiety even when answering affirmatively for all nine questions.

When examining middle-adults with and without children, food insecurity negatively impacted mental health in the presence or absence of children within a home as demonstrated by a significant main effect of food insecurity on depression ($R^2 = .234, F(4, 162) = 12.36, p < .001$) and anxiety ($R^2 = .241, F(4, 156) = 12.411, p < .001$). There was not a significant interaction for household composition and food insecurity predicting anxiety or depression. The effect of food insecurity, household composition, and the interaction of the two on anxiety and depression represented a large effect size (Cohen's $F^2_{\text{depression}} = .31$; Cohen's $F^2_{\text{anxiety}} = .32$). To put in clinical terms, when controlling for self-reported health-quality, the average middle-adult with or without children in the household demonstrated low anxiety and depression at low-levels of food insecurity but met the threshold of concern when reaching high food insecurity (i.e. answering affirmatively to 8 or 9 items).

Discussion

The current study highlights the importance of a developmental approach by considering demographic factors that could explain inter-individual difference related to food insecurity impacting mental health. Specifically, period of the lifespan and whether or not a household contains children provides important contextual information that could influence how to best prevent and intervene when considering the mental health consequences of being food insecure.

Middle adulthood

Previous research has suggested that households with children were twice as likely to worry about food insecurity (Wilde, 2004), but the current study suggests that the period of the lifespan is also important to consider, as middle-adults without children demonstrated similar levels of worry, access, utilization, and availability of food as middle-adults with children and at a significantly higher frequency than late-adults. Moreover, individuals in middle adulthood, regardless of household composition,

engaged in similar frequencies of making food last longer and spending trade-offs, consistently answering affirmatively to these ways of coping with food insecurity at significantly higher rates than their late-adult counterparts. As middle adults report worsened food insecurity and mental health problems, the current study provides further evidence of midlife vulnerability (Robinson et al., 2016). For households without children, the link between food insecurity and depression was much stronger for middle-adults than late-adults. As previously explained, the prevalence of increased mental health issues typically seen during middle adulthood also increases individuals' risk of food insecurity; therefore, results are in line with of the theories of social selection and social causation (Tarasuk et al., 2013), as there may be potential for a cyclical pattern occurring between food insecurity and mental health problems during this period of the lifespan. Food insecurity seemed to be more consequential to mental health for middle-adults, but the manner in which it impacted mental health was more related to whether or not there were children in the house.

Households with children

Households with children are more likely to eat less to make food last longer and were slightly higher in reporting they ate expired food as compared to households without children. Results suggest that food-insecure parents engage in protective strategies that support the child sacrifice theory in which parents/caregivers sacrifice their own food supply in order to ensure food security for their children (Franklin et al., 2012). Results from the current study align with nationally representative data which shows that among food-insecure families, adults are more likely to answer affirmatively to food insecurity items about their food access, worry, availability, and utilization while reporting their children are not food insecure (Coleman-Jensen et al., 2019), further suggesting that parents across the country engage in protective strategies that increase children's food security while worsening parents' personal risks to the consequences of food insecurity. While this approach would protect the child from the physical health consequences of inadequate food, the unmet economic needs associated with poverty and food insecurity erodes the mental health of parents/caregivers, which disrupts necessary elements for responsive parenting and positive parent-child interactions (Teti et al., 2017). This negative mental health consequence was reflected in the current study for both middle adults with and without children, although the consequence of this anxiety may be especially concerning for those with children as it could have a detrimental impact on parenting. Parents with higher anxiety often lack the proper emotional assets to effectively address their children's needs (Collins, 2009), highlighting the need for investigating the specific consequences of food insecurity for middle-adults who live with children as the consequences of how food insecurity impacts mental health may be particularly severe.

Late adulthood

While the current study has specific implications for middle-adults and especially middle-adults with children, differences among age groups could also be due to the individuals' perceptions of food insecurity as a stressor and engagement in coping strategies in light of such stressors. Across all the

nine food insecurity questions, those in late adulthood were less likely to answer affirmatively than those in middle adulthood. This could represent lower risk for food insecurity, but an alternative suggestion through this developmental lens is that the validity of typical food insecurity items for late adults is compromised due to their perception of stress and ability to cope through reframing. Coping has been established as an effort to reduce a stressor that is dynamic and conscious, where individuals can draw from a variety of strategies with a range of positive and negative outcomes in the short and long term (Amirkhan & Auyeung, 2007). Older adults engage in coping strategies that are more targeted towards the stressor as opposed to engaging in avoidant coping strategies; they are also more likely to use reframing of stressors while younger adults are more emotionally reactive. The differences in stressors and coping must be considered in light of perception of the individuals; older individuals may perceive situations as more manageable and less threatening while younger individuals may have a less established sense of personal control (Aldwin et al., 2011; Amirkhan & Auyeung, 2007). Furthermore, when investigating maladaptive food-related coping strategies, such as restricting the amount of food consumption, older adults may perceive these as normative behaviors as opposed to symptoms of food insecurity. Their coping strategy, or the manner in which they engage in protective strategies relevant to food insecurity may be more internal, while those in middle adulthood may engage in more problem-focused coping including a greater use of alternative strategies when goal-relevant resources are limited or unavailable (see Freund & Baltes, 2002). In addition, individuals in later adulthood likely have an increased resistance to negative life events, termed *psychological immunization*, due to having had prior experiences across stressful life events. In this manner, older adults may perceive their access to food differently than younger adults and report lower levels of food insecurity even when objective accounts of food access would suggest otherwise.

Late-adults averaged higher on depression and anxiety, although they were less likely to reach levels of concerns on screeners of depression and anxiety and their symptomatology was less tied to food insecurity. This is consistent with mental health literature in late adulthood suggesting peaks in middle adulthood and then declines in late adulthood, when the prevalence of anxiety disorders is lower but the average level is higher (Bandelow & Michaelis, 2015; Bryant et al., 2008; Haller et al., 2014). There are likely differences in how anxiety manifests itself for late adulthood as compared to other periods of the lifespan (Flint, 2005). It has been proposed that anxiety is more related to challenges in aging, such as somatic issues, over worrying more commonly attributed to anxiety earlier in adulthood, which has been termed, *geriatric anxiety* (Bryant et al., 2008). Furthermore, it must be acknowledged that participation in food assistance programs during late adulthood (i.e. Meals on Wheels, Senior congregate programs) may provide social support benefits that can be protective against the mental health consequences of food insecurity as compared to food assistance programs received by middle-adults (i.e. SNAP, WIC, School meal programs) (Kim & Frongillo, 2007; Wolfe et al., 2003). In summary, food insecurity among late-adulthood may need to be examined in future research in-light of what is known about this period of the lifespan to better assist, prevent, and intervene.

Limitations and future directions

The current cross-sectional study through a developmental lens provides important suggestions for who is most at risk for mental health consequences of food insecurity and suggests further investigation is needed into the validity of food insecurity measurement for late-adults. However, the cross-sectional design of the current study does not allow for conclusions related to cause-and-effects and a longitudinal investigation is warranted to examine how changes in food insecurity status impacts mental health across time. In a study examining major depression among senior adults following the Great Recession of 2007–2009, participants who were initially food insecure had 1.2 times greater odds of major depression than their food-secure counterparts and those who became and remained food insecure as a result of the recession had 1.7 times greater odds of major depression (Bergmans & Wegryn-Jones, 2020). Results emphasize how history-graded influences, similar to the economic decline due to COVID-19 may put individuals at even higher level of depression due to food insecurity than food insecurity during less economically strenuous times. Replication is important given the changes in food insecurity from this latest historical event; replication with larger samples with greater national representation would allow for confidence in generalizability outside of the current state in which this study was conducted.

It is important to note that individuals, regardless of child-status or period of the lifespan were recruited from food assistance organizations, so were receiving some help that may have reduced their food insecurity. The link between mental health and food insecurity may differ for those who are not yet receiving assistance. It is also important to note that families identified if they had children in their households, but not how they were related to the children. Therefore, it should be interpreted with caution that middle-adults with children in this study were the parents. Finally, context is important, and age and household composition are just a few factors influencing food insecurity; future research should examine other inter-individual differences that may explain stronger links between food insecurity and poorer mental health. For example, educational background is important to consider as it can contribute to socioeconomic status, thus, relating to food insecurity. Furthermore, geographic location is also influential in regard to one's surrounding food environment as it serves as a strong determinant in food accessibility and food purchasing behaviors due to neighborhood characteristics, food prices, and availability of fruits and vegetables (Caspi et al., 2012).

Conclusion

In 2018, 11.1% of households in the United States experienced food insecurity, which is the first time in 6 years that food insecurity rates reached 2007 pre-recession levels (Coleman-Jensen et al., 2019). According to Nord and Prell (2007), the national poverty rate and prevalence of food insecurity shift nearly in parallel with each other as food insecurity is significantly associated with income at both the national and household level. In addition, food insecurity is a direct measure of well-being as it links levels of poverty to material hardship and physical and mental health. As the COVID-19 global pandemic continues to disrupt the country's economy, millions of Americans are faced with the challenges of food insecurity and its accompanying consequences (Feeding America, 2020), necessitating more

fine-tuned examination of how to address food insecurity based on inter-individual differences such as period of the lifespan and household composition.

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