Food Insecurity and Housing Instability During Early Childhood as Predictors of Adolescent Mental Health

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This study examined the effects of food insecurity and housing instability experiences during early childhood on adolescent anxiety and depressive symptoms through maternal depression and parenting stress. This longitudinal study included 4 waves of data from the Fragile Families and Child Well-Being Study ($n = 2,626$). Food insecurity was measured when the child was 5 years of age using the U.S. Department of Agriculture's 18-item Food Security Scale. Housing instability was also measured when the child was 5 years of age based on an affirmative response to 6 housing adversity items. Maternal depression and parenting stress were measured when the child was 9 years of age. Anxiety and depressive symptoms were assessed when the child (now adolescent) was 15 years of age using 6 items of the Brief Symptom Inventory 18 anxiety subscale and 5 items of the Centers for Epidemiologic Studies Depression Scale, respectively. Two structural equation models assessed the associations between food insecurity and housing instability on adolescent anxiety (Model 1) and depressive symptoms (Model 2) through maternal depression and parenting stress simultaneously, controlling for sociodemographic characteristics. Results suggest that experiencing both food insecurity and housing instability during early childhood increases the risk of long-term adolescent depressive (indirect: $B = 0.008$, 95% CI [0.002, 0.016]) and anxiety (indirect: $B = 0.012$, 95% CI [0.002, 0.026]) symptoms through maternal depression to parenting stress. Screening for food insecurity and housing instability during early childhood could potentially identify both mothers who are at risk for depression and parenting stress and children who are at increased risk for anxiety or depressive symptoms during adolescence.

Keywords: economic hardship, Fragile Families and Child Well-Being Study, mental health, residential hardship, structural equation models

The association between economic hardship and long-term adverse physical and psychological health outcomes has been well documented (Hernandez & Pressler, 2014; Kahn & Pearlin, 2006; Lillard, Burkhauser, Hahn, & Wilkins, 2015). Food insecurity and housing instability characterize specific types of economic hard-

ships and are associated with one another (Huang & King, 2018; King, 2018). Food security is defined as the state of access to enough food for an active and healthy life, while food insecurity is the lack of access to an adequate amount of healthy and nutritious food (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). The association between food insecurity and negative short-term and long-term child health outcomes is well documented in the literature (Council on Community Pediatrics & the Committee on Nutrition, 2015; Gundersen & Ziliak, 2015). Food insecurity during childhood influences children's physical health (Holben & the American Dietetic Association, 2010) and contributes to internalizing and externalizing problems (Slopen, Fitzmaurice, Williams, & Gilman, 2010). Several studies have linked food insecurity during childhood with adolescent anxiety and depression (McIntyre, Williams, Lavorato, & Patten, 2013; McIntyre, Wu, Kwok, & Patten, 2017; McLaughlin et al., 2012; Poole-Di Salvo, Silver, & Stein, 2016).

Housing instability refers to a continuum of experiences that include frequent residential relocation, inability to consistently pay rent or mortgage, living in an overcrowded household, doubling up with family or friends, or staying in a car or abandoned building due to economic hardship (Geller & Curtis, 2011; Ma, Gee, & Kushel, 2008). The available body of literature on residential

instability suggests poor emotional development and experiences with depression for adolescents (Coley, Leventhal, Lynch, & Kull, 2013; Fowler, Henry, & Marcal, 2015).

Food insecurity and housing instability are correlated and highly prevalent among low-income families and families that access public and private assistance. For instance, over half of clients that access food banks through the Feeding America network have described the daunting task of choosing between paying for housing or food (Weinfield et al., 2014). Consistent food supply and stable housing are basic needs that influence access and utilization of health care (Kushel, Gupta, Gee, & Haas, 2006). The literature on how both food insecurity and housing instability are related to child behavior problems (Fernández, Yomogida, Aratani, & Hernández, 2018) and to chronic diseases among adults is growing (Charkhchi, Fazeli Dehkordy, & Carlos, 2018; Stupplebeen, 2019). However, there is a lack of longitudinal research focusing on how early childhood exposure to both food insecurity and housing instability can influence adolescent mental health.

The Life Course Health Development (LCHD) framework can be used to describe how food insecurity and housing instability during early childhood could possibly influence anxiety and depressive symptoms during adolescence (Halfon & Hochstein, 2002). The LCHD theory attempts to explain how early experiences affect future health patterns and how these experiences can increase the development of diseases in future stages of a life course. Adolescent anxiety and depressive symptoms can be influenced by the programming or latency model within the LCHD framework. Depression and anxiety are highly prevalent comorbid mental health disorders that often manifest during childhood and adolescence (Axelson & Birmaher, 2001). The programming model suggests that early exposure to risk factors during critical periods can have long-term health consequences (Ben-Shlomo & Kuh, 2002; Hertzman, Power, Matthews, & Manor, 2001). Adverse experiences during early childhood, specifically before the age of 5, have been found to be predictive of anxiety disorders during adolescence, specifically at age 15 (Phillips, Hammen, Brennan, Najman, & Bor, 2005). Further, early childhood adversity prior to age 5 has been related to adolescent depression (Hazel, Hammen, Brennan, & Najman, 2008). The negative experiences associated with food insecurity and housing instability during early childhood could contribute to depressive and anxious symptomology in adolescence. Thus, early exposure to food insecurity and housing instability could contribute to mental health disparities in adolescence, which then places adolescents at risk for dropping out of school (Quiroga, Janosz, Bisset, & Morin, 2013), substance use (Valentiner, Mounts, & Deacon, 2004), and adult unemployment (Egan, Daly, & Delaney, 2016).

Within the family environment, there could be mechanisms that could influence the relationship between early childhood experiences with food insecurity and housing instability. The accumulation of stress associated with food insecurity and housing instability could influence maternal depression (Bronte-Tinkew, Zaslow, Capps, Horowitz, & McNamara, 2007; Davey-Rothwell, German, & Latkin, 2008; Suglia, Duarte, & Sandel, 2011; Whitaker, Phillips, & Orzol, 2006), and maternal depression has been associated with adolescent anxiety and depressive symptoms (Spence, Najman, Bor, O'Callaghan, & Williams, 2002). In addition, the depletion of resources associated with experiencing food insecurity and housing instability could contribute to greater parenting stress (Gershoff, Aber, Raver, & Lennon, 2007; Rodriguez-JenKins & Marcenko, 2014). Increased levels of parenting stress have been associated with placing adolescents at risk for depression and anxiety (Tan & Rey, 2005). Last, prior research has suggested that maternal depression influences parenting stress (Gerdes et al., 2007). Thus, mechanisms of the relationship between early childhood experiences with food insecurity and housing instability with adolescent depressive and anxiety symptoms could be through maternal depression, parenting stress, or maternal depression to parenting stress. Pinpointing some of the underlying mechanisms that predict the development of adolescent depressive and anxiety symptoms can help in the development of prevention programs.

Drawing from the LCHD framework (Halfon & Hochstein, 2002), the current study examines how food insecurity and housing instability experiences during early childhood influence anxiety and depressive symptoms during adolescence while accounting for maternal depression and parenting stress as mediators. Based on the programming model, experiencing food insecurity or housing instability during early childhood could be a critical period for later experiencing mental health problems during adolescence. The effect of experiencing both food insecurity and housing instability during a critical period on anxiety and depressive symptoms has not been reported in the adolescent literature.

Method

Data and Sample

This study used secondary data from the Fragile Families and Child Well-Being Study, which follows 4,898 U.S. children born between 1998 and 2000. The data were collected from 20 large U.S. cities. The main survey, which consists of interviews with mothers and fathers, was initially conducted at birth and then by telephone when the child was 1, 3, 5, 9, and 15 years old. At age 15, the children, now adolescents, reported on their own anxiety and depression symptomology. In addition to the main survey, a subsample of mothers participated in an in-home assessment when the child was 3 and 5 years old. The in-home assessment included questions regarding household food insecurity that are not available in the main survey. Sampling and study design have been previously reported (Reichman, Teitler, Garfinkel, & McLanahan, 2001).

The sample for the current study excluded adolescents who did not participate in the Year 15 youth interview (1,454 excluded), mothers who did not participate in the Year 9 mother interview (314 excluded), families who were missing both Year 3 and 5 in-home assessments (46 excluded), and mothers who were not interviewed at Year 3 (151 excluded). The sample was further reduced based on missing data on adolescents' measures of anxiety and depressive symptoms (6 excluded) and covariates (301 excluded). Families that had complete data on the variables of interest but were missing data on Year 5 food insecurity or housing instability were kept in the data set if there were available data for these measurements at Year 3. Keeping with the LCHD framework, the focus of the independent variable was on experiences that occurred during early childhood. Based on additional analyses (not reported), families who experienced food insecurity at Year 3 were more likely to experience food insecurity at Year 5. In addition, families who experienced housing instability at Year 3

were more likely to experience housing instability at Year 5. Data available at Year 3 were used when data from Year 5 were missing because of the correlational relationship and the data fit the stage of development that coincided with our LCHD framework ($n =$ 808 food insecurity; $n = 390$ housing instability). The final sample for this study was 2,626 families.

Attrition analyses were done to compare the analytic sample to the excluded sample due to missing data using one-way analysis of variance tests for continuous variables and chi-square tests for categorical variables. The excluded families in this study were more likely to be at or below 1.99 of the poverty ratio. Excluded mothers were more likely to be employed and have less than a high school education. Excluded children were more likely to be male and uninsured. The study was approved by the University of Houston's Institutional Review Board #13394-EX.

Measures

Adolescent depressive and anxiety symptoms.

Depressive symptoms. Adolescents' self-reported depressive symptoms were assessed using five items of the Centers for Epidemiologic Studies Depression Scale (Perreira, Deeb-Sossa, Harris, & Bollen, 2005) at Year 15. Adolescents reported the difficulty for overcoming depressive feeling, sadness, happiness, being depressed, and as though life was not worth living in the past week using a 4-point scale ranging from 0 = *strongly agree* to 3 = *strongly disagree*. The response about "feeling happiness" was reversely coded. Responses were summed to create a total score ranging from 0 to 15, with higher scores indicating greater depressive symptoms (Perreira et al., 2005). Internal consistency (Cronbach's alpha) of the five items for the depression measure in this sample was 0.76.

Anxiety symptoms. Adolescents' self-reported anxiety symptoms were assessed using six items of the Brief Symptom Inventory 18 item anxiety subscale (Derogatis & Fitzpatrick, 2004) at Year 15. Adolescents responded to the following six questions: "During the past seven days, how much were you distressed by: spells of terror or panic, feeling tense or keyed up, suddenly scared for no reason, nervousness or shakiness inside, feeling fearful, feeling so restless you couldn't sit still?" A 4-point scale ranging from 0 = *not at all* to 3 = *extremely* was used. Responses were summed to create a total score ranging from 0 to 18, with higher scores indicating greater anxiety symptoms. Internal consistency (Cronbach's alpha) of the six items for the anxiety measure in this sample was 0.76.

Potential mediators: Maternal depression and parenting stress.

Maternal depression. Maternal depression was self-assessed using the 15-item Composite International Diagnostic Interview–Short Form (CIDI-SF) at Year 9 (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The CIDI-SF is a screener that is used to evaluate the probability an individual would be diagnosed with depression if the full CIDI questions were provided. The items are consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013). Mothers were asked items such as low energy, feeling sad or blue, and weight changes in the past year that lasted for 2 weeks or more during the past 12 months. Mothers were classified as depressed based on CIDI-SF scoring criteria as outlined by Kessler et al.

(1998). Further information on the scoring criteria can be found on the Fragile Families and Child Well-Being Study website (Bendheim-Thoman Center for Research on Child Wellbeing, 2018).

Parenting stress. Parenting stress was assessed by mothers responding using the Parenting Stress Inventory at Year 9 (Abidin, 1995). Mothers were asked the following four items: "Being a parent is harder than I thought it would be," "I feel trapped by my responsibilities as a parent," "I find that taking care of my child(ren) is much more work than pleasure," and "I often feel tired, worn out, or exhausted from raising a family." A 4-point scale ranging from 1 = *strongly disagree* to 4 = *strongly agree* was used. An average score ranging from 1 to 4 was used, and higher scores indicate greater parenting stress (Bendheim-Thoman Center for Research on Child Wellbeing, 2018). Internal consistency (Cronbach's alpha) of the four items for parenting stress measure in this sample was 0.66.

Early childhood experiences with food insecurity and housing instability.

Food insecurity. Household food insecurity was reported by mothers at Year 5 using the 18-item U.S. Department of Agriculture's Food Security Survey Module questionnaire (Bickel, Nord, Price, Hamilton, & Cook, 2000). Examples of survey questions that assessed food access and availability in the past 12 months included how often participants "worried about running out of food before having more money to buy food again" and how often "meals were skipped or cut size to last longer." Families were categorized into two categories: (a) food secure if mothers gave zero to two affirmative responses or (b) food insecure if families answered three or more affirmative responses (Coleman-Jensen et al., 2018).

Housing instability. Housing instability was determined based on whether the family experienced a housing adversity at any point in the 12 months preceding the interview. At Year 5, the mothers answered six questions that capture housing hardships caused by financial constraints (Geller & Curtis, 2011). These questions included "not being able to pay rent or mortgage," "getting evicted," "being delinquent on housing-related bills," "borrowing money from friends or family to pay for bills," "moving in with others," and "staying at a shelter, abandoned building, or in a car due to financial problems." In this study, participants were classified into two categories: (a) housing stability if the mothers did not give any affirmative answers and (b) housing instability if the mothers gave one or more affirmative answers (Geller & Franklin, 2014).

Experiences with food insecurity and housing instability. Four dichotomous variables were created to classify the independent variables in this study: (a) both food security and housing stability, (b) food insecurity only, (c) housing instability only, and (d) both food insecurity and housing instability. Both food and housing secure included all families who did not experience any instances of food insecurity or housing instability (reference group). Food insecurity included all families who experienced food insecurity while being housing stable. Housing instability included all families who experienced housing instability while being food secure. Both food insecurity and housing instability included all families who experienced both food insecurity and housing instability.

Covariates. Sociodemographic characteristics were used to control for factors that are known to influence food insecurity, housing instability, maternal depression, parenting stress, and adolescent's anxiety and depressive symptoms. Adolescent characteristics included adolescent's sex (male or female [reference]) at baseline, health insurance (uninsured [reference], private insurance, or public insurance) at Year 3, (Kushel et al., 2006), and race/ethnicity (White, Hispanic, or Black [reference]) at Year 15. Maternal and household characteristics at Year 3 included: mother's age (years), marital status (married/cohabiting or single/widowed/divorced [reference]), education (less than a high school degree [reference], high school degree or equivalent, or some college or more), employment (employed or unemployed [reference]), income (based on the family income to the federal poverty line [FPL]: FPL ≤ 1.99 [reference], FPL 2.00–2.99, or FPL ≥ 3.00; Slopen et al., 2010), and history of paternal incarceration (no [reference] or yes; Geller & Franklin, 2014; Turney, 2015). Because the intergenerational transmission of mental illness has been observed in previous studies (Garber & Cole, 2010), maternal depression and anxiety based on the CIDI-SF at Year 3 were also included in the respective models (no [reference] or yes; Kessler et al., 1998; Walters, Kessler, Nelson, & Mroczek, 2002). Food insecurity and housing instability at Year 15 was also included as a covariate (none [reference], housing instability only, food insecurity only, and both food insecurity and housing instability).

Statistical analysis. Descriptive statistics were conducted for the full sample and by food insecurity and housing instability groups. Bivariate analyses were conducted to compare variables of interest among those that experienced food security and housing stability with (a) those that experienced food insecurity only, (b) those that experienced housing instability only, and (c) those that experienced both food insecurity and housing instability. One-way analysis of variance tests were used for continuous variables; chi-squared tests were used for categorical variables. Covariate-adjusted structural equation models were used to test the association of the categorical food insecurity and housing instability experiences during early childhood with anxiety and depressive symptoms occurring during adolescence through mediators, maternal depression and parenting stress. Models predicting adolescent anxiety symptoms included maternal anxiety. Models predicting adolescent depressive symptoms included maternal depression. Descriptive statistics, one-way analysis of variance tests, and chi-squared tests were performed using STATA SE Version 15.1 statistical software (StataCorp LP, College Station, Texas), and structural equation models were performed using Mplus (Muthen & Muthen, Los Angeles, CA). We report the unstandardized betas and 95% confidence intervals of 5,000 bootstrap samples below unless where noted.

Results

Descriptive Results

Table 1 presents descriptive statistics for the entire analytic sample and by food insecurity and housing instability subgroups. In the full sample, average scores of adolescents' depressive and anxiety symptoms at Year 15 are 5.12 (SD = 2.29; out of 15) and 4.82 (SD = 3.90; out of 18), respectively. During early childhood, 52% of families experienced both food security and housing stability, and 4% of families experienced food insecurity only while being housing stable.

Thirty-three percent of families experienced housing instability while being food secure, and 11% of families were both food insecure and housing unstable. Fifty-one percent of adolescents were males, 49% were Black, and 52% had public health insurance. On average, mothers were 28 years old, 37% were single, 39% had some college or more, 60% were employed, 65% were 1.99 or less of the FPL, and 45% of the adolescents' fathers had experienced incarceration. Five percent of mothers had met anxiety criteria and 21% of mothers met depression criteria at Year 3. During adolescence (Year 15), 55% of families were both food secure and housing stable, and 3% of families experienced food insecurity only while being housing stable. Thirty percent of families experienced housing instability while being food secure, and 12% of families experienced both food insecurity and housing instability.

On average, adolescents who were food secure and housing stable showed different characteristics compared to adolescents who had experienced both/either food insecurity and/or housing instability during early childhood. Adolescents who were food secure and housing stable reported significantly lower scores of depressive and anxiety symptoms, were more likely to be White and less likely to be Black, and have private health insurance. Their mothers were older and more likely to live with their spouse and partner, have some college or more education, be employed, and be at or above 3.00 of the poverty ratio. Also, the percentage of paternal incarceration and maternal anxiety and depression was lower than that of those who had experienced both/either food insecurity and/or housing instability during early childhood.

Adolescent Depressive Symptom Model

Only the significant paths of the covariate-adjusted structural equation model for each outcome are described below. In the context of the overall model (see Figure 1), adolescents who experienced food insecurity only during early childhood significantly showed greater adolescent depressive symptoms (B = 0.626, 95% CI [0.052, 1.226]). Early childhood experiences of housing instability only (B = 0.273, 95% CI [0.132, 0.422]) and experiencing both food insecurity and housing instability (B = 0.323, 95% CI [0.114, 0.523]) significantly predicted maternal depression at Year 9. Experiences of both food insecurity and housing instability at Year 5 predicted greater parenting stress at Year 9 (B = 0.181, 95% CI [0.037, 0.329]), and greater parenting stress at Year 9 predicted greater adolescent depressive symptoms at Year 15 (B = 0.147, 95% CI [0.065, 0.229]). Maternal depression at Year 9 significantly predicted higher parenting stress at Year 9 (B = 0.161, 95% CI [0.096, 0.227]).

Taken together, the relationship of both food insecurity and housing instability at Year 5 predicting adolescent depressive symptoms at Year 15 through both maternal depression and parenting stress at Year 9 was statistically significant (total indirect: B = 0.055, 95% CI [0.007, 0.110]). Mediation through both mediators explained 4.4% of the relationship between housing instability only (total effect: B = −0.037, 95% CI [−0.233, 0.169]), food insecurity only (total effect: B = 0.647, 95% CI [0.071, 1.236]), and both food insecurity and housing instability (total effect: B = 0.265, 95% CI [−0.062, 0.588]) during early childhood and of adolescent depressive symptoms at Year 15.

Parenting stress at Year 9 partially mediated experiencing both food insecurity and housing instability during early childhood and

Table 1

Descriptive Statistics of the Total Analytic Sample and by Food and Housing Insecurity Status, M (SD) or %

Variable	Total analytic sample (N = 2,626)	Food and housing secure (n = 1,370)	Housing instability only (n = 883)	Food insecurity only (n = 92)	Food insecurity and housing instability (n = 281)
Adolescent mental health					
Depressive symptoms	5.12 (2.29)	5.01 (2.24)[a,b]	5.09 (2.27)	5.93 (2.85)	5.50 (2.37)
Anxiety symptoms	4.82 (3.90)	4.58 (3.82)[a,b]	4.85 (3.97)	5.77 (4.06)	5.59 (3.87)
Early childhood economic hardship experiences					
Food and housing secure	52%	100%	—	—	—
Housing instability only	33%	—	100%	—	—
Food insecurity only	4%	—	—	100%	—
Food insecurity and housing instability	11%	—	—	—	100%
Potential maternal mediators					
Mother depression					
No	83%	89%	78%	77%	70%
Yes	17%	11%[a,b,c]	22%	23%	30%
Parent stress	2.71 (1.07)	2.64 (1.07)[b,c]	2.72 (1.05)	2.77 (1.13)	3.00 (1.03)
Adolescent characteristics					
Sex					
Female	49%	47%	55%	46%	43%
Male	51%	53%[c]	45%	54%	57%
Race					
White	27%	31%[a,b,c]	23%	9%	18%
Hispanic	24%	27%[c]	19%	28%	27%
Black	49%	42%[a,b,c]	58%	63%	55%
Health insurance					
Uninsured	6%	5%[b]	5%	9%	9%
Private	42%	50%[a,b,c]	37%	15%	29%
Public	52%	45%[a,b,c]	57%	76%	62%
Maternal and household characteristics					
Age	28.16 (6.01)	28.99 (6.30)[a,b,c]	27.18 (5.45)	27.59 (6.71)	27.38 (5.38)
Marital status					
Married/cohabiting	63%	70%	59%	54%	54%
Single/widowed/divorced	37%	30%[a,c]	41%	46%	46%
Education					
Less than high school	30%	27%[a,b]	31%	47%	36%
High school diploma	31%	30%[a]	31%	41%	34%
Some college or more	39%	43%[a,b,c]	38%	13%	30%
Employment					
Employed	60%	61%	61%	42%	53%
Unemployed	40%	39%[a,b]	39%	58%	47%
Income (based on federal poverty line, FPL)					
≤1.99 FPL	65%	56%[a,b,c]	71%	82%	86%
2.00–2.99 FPL	14%	15%[b]	15%	9%	10%
≥3.00 FPL	21%	29%[a,b,c]	14%	9%	4%
History of paternal incarceration					
No	55%	64%	52%	36%	40%
Yes	45%	36%[a,b,c]	48%	64%	60%
Maternal depression					
No	79%	86%	75%	71%	61%
Yes	21%	14%[a,b,c]	25%	29%	39%
Maternal anxiety					
No	95%	98%	94%	91%	85%
Yes	5%	2%[a,b,c]	6%	9%	15%
Adolescent economic hardship experiences					
Food and housing secure	55%	63%	43%	48%	29%
Housing instability only	30%	29%[b,c]	39%	24%	35%
Food insecurity only	3%	3%[a]	3%	11%	5%
Food insecurity and housing instability	12%	5%[a,b,c]	15%	17%	31%

[a] $p < .05$ food and housing secure versus food insecurity only.   [b] $p < .05$ food and housing secure versus food and housing insecure.   [c] $p < .05$ food and housing secure versus housing instability only.

adolescent depressive symptoms at Year 15, controlling for maternal depression at Year 9 (specific indirect: $B = 0.026$, 95% CI [0.004, 0.058]). Parenting stress at Year 9 accounted for 4.2% of the total effects from food insecurity and housing instability at

Year 5 to adolescent depressive symptoms at Year 15. Last, there was a significant indirect effect from housing instability only (specific indirect: $B = 0.006$, 95% CI [0.002, 0.013]) and both food insecurity and housing instability (specific indirect: $B =$
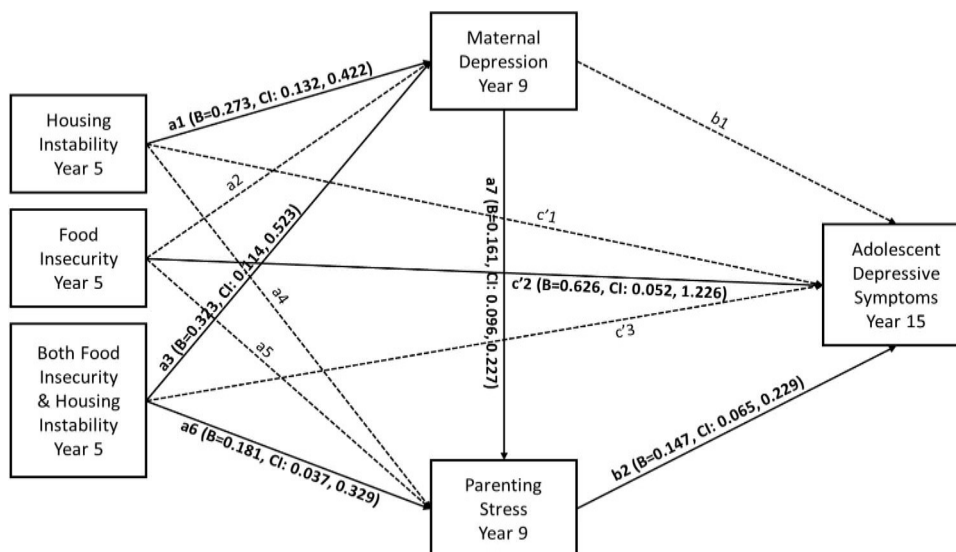
Figure 1. Covariate-adjusted structural equation model for adolescent depressive symptoms. The paths without the unstandardized beta and 95% confidence interval were tested but not observed significant. The root mean square error of approximation (RMSEA) = 0.645, comparative fit index (CFI) = 0.883, Tucker–Lewis index (TLI) = −0.230, and chi-square test of model fit < .001 are reported as the model fit.

0.008, 95% CI [0.002, 0.016]) at Year 5 to adolescent depressive symptoms at Year 15 through maternal depression to parenting stress.

Adolescent Anxiety Symptom Model

In the context of the overall model (see Figure 2), adolescents who experienced food insecurity only (B = 0.913, 95% CI [0.064,

1.814]) and both food insecurity and housing instability (B = 0.681, 95% CI [0.114, 1.235]) at Year 5 significantly showed greater adolescent anxiety symptoms at Year 15. Experiencing housing instability only (B = 0.318, 95% CI [0.179, 0.463]) and both food insecurity and housing instability (B = 0.410, 95% CI [0.204, 0.607]) significantly predicted maternal depression at Year 9. Experiencing both food insecurity and housing instability at Year 5 (B = 0.174, 95% CI [0.028, 0.323]) significantly predicted
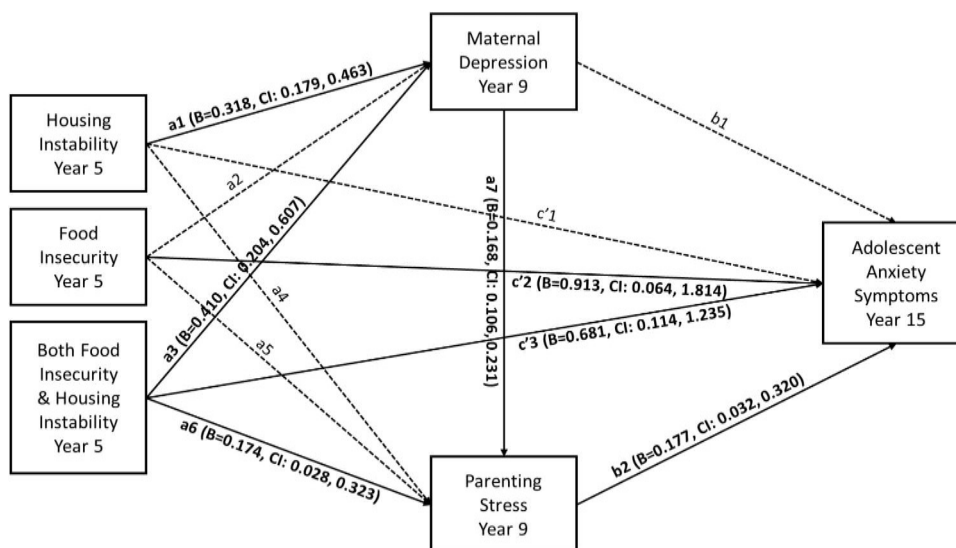

Figure 2. Covariate-adjusted structural equation model for adolescent anxiety symptoms. The paths without the unstandardized beta and 95% confidence interval were tested but not observed significant. The root mean square error of approximation (RMSEA) = 0.469, comparative fit index (CFI) = 0.803, Tucker–Lewis index (TLI) = −1.066, and chi-square test of model fit < .001 are reported as the model fit.

parenting stress at Year 9, and greater parenting stress at Year 9 significantly predicted greater adolescent anxiety symptoms at Year 15 ($B = 0.177$, 95% CI [0.032, 0.320]). Maternal depression at Year 9 significantly predicted higher parenting stress at Year 9 ($B = 0.168$, 95% CI [0.106, 0.231]).

Taken together, the relationship of housing instability only (total indirect: $B = 0.042$, 95% CI [-0.032, 0.124]), food insecurity only (total indirect: $B = 0.041$, 95% CI [-0.038, 0.134]), and both food insecurity and housing instability (total indirect: $B = 0.091$, 95% CI [-0.003, 0.196]) at Year 5 predicting adolescent anxiety symptoms through both maternal depression and parenting stress at Year 9 was not statistically significant. Mediation through both mediators explained 3.2% of the relationship between housing instability only (total effect: $B = 0.117$, 95% CI [-0.220, 0.473]), food insecurity only (total effect: $B = 0.954$, 95% CI [0.118, 1.839]), and both food insecurity and housing instability (total effect: $B = 0.772$, 95% CI [0.211, 1.308]) at Year 5 and of adolescent anxiety symptoms at Year 15.

Parenting stress at Year 9 partially mediated experiencing both food insecurity and housing instability during early childhood and adolescent anxiety symptoms at Year 15, controlling for maternal depression at Year 9 (specific indirect: $B = 0.031$, 95% CI [0.001, 0.075]). Parenting stress at Year 9 accounted for 4.2% of the total effects from food insecurity and housing instability at Year 5 to adolescent anxiety symptoms at Year 15. Last, there was a significant indirect effect from housing instability only (specific indirect: $B = 0.009$, 95% CI [0.001, 0.021]) and both food insecurity and housing instability (specific indirect: $B = 0.012$, 95% CI [0.002, 0.026]) at Year 5 to adolescent anxiety symptoms at Year 15 through maternal depression to parenting stress at Year 9.

Discussion

The current study drew on the LCHD framework to examine how food insecurity and housing instability experiences during early childhood influence the development of adolescent mental health symptoms through maternal depression and parenting stress (Halfon & Hochstein, 2002). Results indicate the majority of the families did not experience any economic hardship in the form of food insecurity and housing instability. While few families only experienced food insecurity (while being housing secure), a greater percentage of families experienced only housing instability (while being food secure). This discrepancy could be related to numerous antipoverty programs available to families with young children that are directly (i.e., Women, Infants and Children [WIC] program) or indirectly (i.e., Early Head Start and Head Start) targeted at preventing food insecurity. Further, findings suggest that food insecurity and housing instability coexist with 11% of the sample experiencing both forms of economic hardship during early childhood. Although few families experienced only food insecurity (while being housing secure), several more families that experienced food insecurity appeared to be experiencing other forms of hardship, in this case housing related.

Similar to previous research, food insecurity during early childhood directly influences adolescent depressive symptoms (standardized $B = 0.273$, 95% CI [0.023, 0.533]) and anxiety symptoms (standardized $B = 0.234$, 95% CI [0.016, 0.466]; McIntyre et al., 2013, 2017; McLaughlin et al., 2012). Contrary to previous research, the findings from the current study do not indicate a direct

relationship between housing instability and adolescent depressive symptoms (Coley et al., 2013; Fowler et al., 2015), nor was a direct relationship between housing instability and adolescent anxiety symptoms found. Interestingly, the cumulative effect of experiencing both food insecurity and housing instability influences adolescent anxiety symptoms directly (standardized $B = 0.175$, 95% CI [0.029, 0.316]). When comparing the standardized betas of the significant direct paths, the path from food insecurity to adolescent anxiety symptoms is larger than the path from the cumulative effect of experiencing both food insecurity and housing instability on adolescent anxiety symptoms. Thus, the risk of experiencing adolescent anxiety symptoms does not increase as a result of experiencing both food insecurity and housing instability compared to solely experiencing food insecurity. Overall, (a) experiencing food insecurity without any other economic hardship or (b) experiencing food insecurity, in addition to another form of economic hardship, places children at greater risk of experiencing depressive and anxiety symptoms during adolescence. While the independent and dependent measures are 10 years apart, there seems to be a direct correlation between the household-level anxiety of not having food available or stable housing and adolescents experiencing poor mental health symptoms.

The mechanisms that help to partially explain the relationship between economic hardship during early childhood and adolescent mental health symptoms do differ depending on the independent variable. While the current findings are similar to previous research that has found housing instability to be predictive of maternal depression (Davey-Rothwell et al., 2008; Suglia et al., 2011), maternal depression was not directly influenced by food insecurity. Despite prior research finding food insecurity to directly influence maternal depression (Bronte-Tinkew et al., 2007; Whitaker et al., 2006), the models in prior research did not include housing instability, which may be why current findings differ. In addition, other parenting and family environmental mechanisms that were not assessed could be more influential in explaining the relationships between early childhood experiences with food insecurity and adolescent mental health. Further, comparable to earlier work that has found maternal depression to be predictive of parenting stress (Gerdes et al., 2007), and parenting stress to be predictive of child and adolescent depressive and anxiety symptoms (Tan & Rey, 2005), the current findings replicated such work. The behaviors associated with housing instability (e.g., frequent moves, the inability to pay rent, and borrowing money) may contribute to social isolation and a lack of social support, which could then lead to maternal depression and ultimately increase the stress associated with parenting. The progression of these risk factors is then internalized by adolescents and manifested as depressive and anxiety symptoms.

In addition, the cumulative effect of experiencing both food insecurity and housing instability influences adolescent depressive and anxiety symptoms indirectly: (a) through maternal depression to parenting stress and (b) through parenting stress. The underlying behaviors associated with the first indirect path (i.e., maternal depression to parenting stress) could be similar to what was previously described in the above paragraph. It is important to point out that our models found a significant association between maternal depression and parenting stress; however, prior research has found parenting stress to be predictive of maternal depression

(Farmer & Lee, 2011). Further, the current findings suggest that the behaviors associated with experiencing both insufficient access to food and the inability to pay rent or frequently moving directly influence parenting stress, which increases the risk of adolescents experiencing poor mental health symptoms. Thus, maternal depression and parenting stress are significant consequences to experiencing both food insecurity and housing instability and precursors to adolescents withstanding depressive and anxiety symptoms.

These findings suggest the need for interventions that integrate broad mental health and coping strategies for families that experience economic hardship. WIC and similar public food assistance programs, such as the Supplemental Nutrition Assistance Program, present a promising opportunity to screen for housing instability. Another notable opportunity for housing instability screening is at pediatricians' offices, where food insecurity screening is already recommended by the American Academy of Pediatrics (Council on Community Pediatrics & the Committee on Nutrition, 2015). Additional opportunities for screening could be available through private programs, such as food pantries and farmers' market programs. Screening for housing instability within the food assistance programs, or screening for both during a child well visit, can clear a path for identifying those who are in need of both food and housing assistance. Such screening will also identify mothers who are at risk for maternal depression and increased parenting stress, as well as children who are at increased risk for anxiety or depressive symptoms during adolescence. The collaborating nature of organizations working together to address multiple components of economic adversity could possibly lead to reducing mental health disparities among mothers and adolescents.

While this study highlights the risk factors that may lead up to adverse mental symptoms during adolescence, the results should be interpreted within the context of its limitations. Food insecurity and housing instability were self-reported by the mothers, and mental health outcome measures were self-reported by the adolescents. This raises the possibility of reporting bias, which may lead to under- or overestimating the variables of interest. However, having the independent and dependent variables measured by different reporters decreases the findings to be attributed to shared method variance. Another limitation is that our study used dichotomous variables to measure food insecurity and housing instability. This resulted in our analysis not accounting for the variability in these measures and the severity of experiences during early childhood. Despite this limitation, our measures make an important contribution because they are consistent with how previous studies have used these items. This consistency allows for the comparison of findings across literature. Related, the current study does not take into account additional economic hardships that can co-occur with food insecurity and housing instability; thus, the measure of hardship is conservative in this study. Yet, the narrow focus does provide the opportunity to pinpoint services (as described above) that could reduce the type of hardship experienced along with the negative mental health consequences by collaborating together. Last, the first data collection time point in this study was 1998, followed by subsequent years. Consequently, the data may be not be perceived as current. For a longitudinal study, however, to examine the influence of early childhood experiences on adolescent mental health outcomes, it is necessary to use data that span over a least 15 years. Therefore, using these data is appropriate for the aims of the study.

This is the first study to the authors' knowledge to demonstrate that experiencing food insecurity and housing instability during early childhood does place children at risk for depressive and anxiety symptoms in subsequent adolescent years. The current findings could possibly inform interventions geared at mothers who are most at risk for experiencing depression and increased parenting stress and children who are most at risk for experiencing depressive and anxiety symptoms during adolescence based on food insecurity and housing instability experiences during early childhood. Future studies are encouraged to examine how experiences with food insecurity and housing instability at different stages of development—early childhood versus middle childhood—influence adult and adolescent mental health. Additionally, research studies are needed to understand the temporal order of food insecurity and housing instability experiences. That is, it is important to know which form of economic hardship precedes the other or whether a bidirectional relationship exists. The findings, in addition to previous literature (Geller & Franklin, 2014; Turney, 2015), also suggest that there are other correlating family environmental factors (e.g., parental incarceration) that may place added economic and mental pressure for some families more than others. In other words, examining the moderating factors, in addition to the mechanisms, is needed to progress the literature. Understanding how experiencing different forms of economic hardship at various stages of development, the temporal order of economic hardship experiences, and how the family environmental factors moderate the relationship between early childhood economic hardship experiences and adolescent mental health can inform family-based prevention strategies.

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