


# Food Insecurity and Mental Well-Being Among Low-Income Families During COVID-19 Pandemic

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## Abstract

**Purpose:** To examine the interaction effects of adult and child food insecurity on parents' and children's mental well-being.

**Design:** An online survey study was conducted.

**Setting:** Two Head Start organizations and the Qualtrics Panel.

**Subjects:** Four hundred and eight parents under poverty level and having a child aged 3–5 years participated.

**Measures:** Food insecurity was assessed by the U.S. Household Food Security Survey Module. Parents' stress, anxiety and depression; and children's sadness, fear, anger, and positive affect were measured using instruments from HealthMeasures.

**Analysis:** Multivariate general linear models were performed in SPSS.

**Results:** Mean age was 31 years, 17% Hispanic, 21% Black. About 51% parents and 37% children were food insecure. After adjusting for demographics and child food insecurity, parents with adult food insecurity had higher stress ( $B = 2.65, p = .002$ ), anxiety ( $B = 3.02, p = .001$ ), and depression ( $B = 3.66, p = .001$ ); and fear in their children ( $B = 5.03, p = .002$ ) than those without adult food insecurity. Similarly, parents reporting child food insecurity had greater depression than those having no child food insecurity ( $B = 4.61, p = .020$ ). Black parents had lower stress ( $B = -1.91, p = .018$ ), anxiety ( $B = -2.26, p = .012$ ), and depression ( $B = -4.17, p < .001$ ) than their White counterparts.

**Conclusions:** The study's results underscore the importance of reducing food insecurity in both parents and children as a whole family system to promote mental well-being of low-income families.

## Keywords

food insecurity, mental well-being, stress, anxiety, depression, parents, children, low income

## Purpose

On April 26<sup>th</sup>, 2021, the World Health Organization<sup>1</sup> reported nearly 147 million confirmed coronavirus disease 2019 (COVID-19) cases globally, with over three million deaths. The United States (U.S.) had the most confirmed cases worldwide with a total of >31 million.<sup>1</sup> Although the COVID-19 pandemic is affecting all families, health-related disparities based on socioeconomic status are evident. Compared to families with higher incomes, those having a low income are at a greater risk of infection and severe illness from COVID-19 due to adult members working outside the home in essential job positions, using public transportation, and having existing comorbidities, limited resources, poor sanitation, and lack of health insurance.<sup>2,3</sup>

To reduce the spread of COVID-19, countries have implemented social distancing protocols and required closures of

businesses, educational institutions, and other organizations with the end result being high unemployment and inflation.<sup>4</sup> Although necessary, this response to the pandemic has led to job losses or reductions in work hours, especially among low-income family members who usually are employed in minimum wage positions that do not allow for working from home.<sup>3,5</sup> Daycare and school closures have also contributed to low-income families' financial difficulties due to the need to care for children at home. The high cost associated with adequately feeding a family every day coupled with the loss of

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children's free or reduced-price meals at school has resulted in an increase in food insecurity.<sup>3,6</sup> The problem of food insecurity is further exacerbated by the limited availability of food assistance programs and lack of easy access to public transportation.<sup>7</sup> Sadly, the issues contributing to high food insecurity disproportionately affect low-income families.<sup>8</sup> Overall, the rate of food insecurity (24.8%) increased by approximately one third compared to the year prior to COVID-19 (18.8%), with 35.5% being newly food insecure.<sup>7</sup> Not surprisingly, the food insecurity rate increased much more in low-income families with an 80% increase.<sup>9</sup>

Globally, food insecurity is significantly associated with adults' poor mental well-being.<sup>10,11</sup> One recent meta-analysis with 19 studies showed that food insecurity was positively related to stress and depression, but not anxiety; in addition, food insecurity had greater effects on depression among older adults and men compared to younger adults and women.<sup>12</sup> Among low-income families with young children, food insecurity was found to coincide with maternal depression and domestic violence.<sup>13</sup> Moreover, the effects of food insecurity on adults' mental well-being vary according to different geographic locations. For example, food insecurity had the highest influence on stress and anxiety among adults living in North America, as compared to other geographic locations.<sup>12</sup> Collectively, this information highlights the need to examine the relationships between food insecurity and various mental health conditions in different populations.

Besides having an adverse effect on adults' well-being, food insecurity also leads to negative outcomes among children. For example, food insecurity contributes to children's impaired growth and development, cognitive deficits, behavior problems, and chronic physical and mental health issues.<sup>8,14</sup> In adolescents, food insecurity can increase the risk of depression and suicidal ideation; while in school-age children, the problem can impair learning and school performance.<sup>15</sup> However, limited research has been conducted to examine the relationship between food insecurity and mental well-being among children younger than age 6. One prospective birth cohort study focusing on children aged 4–8 years old found that the relationships between food insecurity and mental health problems were modified by families' demographics.<sup>16</sup> Specifically, after adjusting for family demographics, food insecurity was significantly associated only with children's hyperactivity/inattention, but not anxiety or depression.<sup>16</sup>

To our best knowledge, no study has examined adult food insecurity and child food insecurity separately, and the main and interaction effects of adult food insecurity and child food insecurity on adult and child mental well-being, respectively. Understanding in this area is particularly important at this time because the current COVID-19 pandemic has severely exacerbated food insecurity worldwide, especially among low-income families.<sup>7</sup> The pandemic has also contributed to a variety of mental health problems in adults and children, such as increased stress, anxiety, depression, anger, fear, boredom,

and even excessive substance abuse and domestic violence.<sup>17</sup> Therefore, it is imperative to examine the relationships between food insecurity and mental well-being among low-income families, particularly those with young children under the age of 6, in this pandemic environment. The purpose of this study was to examine the relationships between food insecurity and mental well-being among low-income parents and preschoolers aged 3–5 years old during the COVID-19 pandemic. Moreover, the study explored how adult food insecurity and child food insecurity interactively affected parents' and children's mental well-being, respectively.

## Methods

A cross-sectional study was conducted to collect online survey data on low-income parents' and children's demographics, food insecurity status, and mental well-being via Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)). The University Institutional Review Board approved the study. Parents indicated their consent to participate in the study by voluntarily submitting the completed online survey.

## Sample

The study included two samples: one sample was recruited from two Head Start organizations in Michigan, and the other sample was recruited nationally via Qualtrics Panel. Head Start is a free program to promote school readiness among children aged 0–5 from low-income families.<sup>18</sup> Head Start parents were eligible to participate if they (1) had a Head Start child aged 3–5 years old; (2) were adult legal guardians aged 18–70 years old; and (3) spoke and understood English. Parents from Qualtrics Panel were eligible if they (1) lived in the U.S.; (2) had a child aged 3–5 years old who had attended a preschool before the pandemic started; (3) met the U.S. Census Bureau's poverty thresholds by the family size and family income in 2020<sup>19</sup>; (4) were adult legal guardians aged 18–70 years old; and (5) spoke and understood English. Sample size was determined with power analysis. With Type I error  $\alpha = 0.05$ , 12 predictors, and small effect size  $f^2 = .045$ , we needed at least 396 participants to achieve a study power of 80%.

## Procedures

To recruit Head Start parents from one urban and one rural Head Start organization, an IRB-approved recruitment email was sent to each family with a Head Start child aged 3–5 years old. One adult parent or legal guardian from each family was asked to complete the online survey. Each family received a \$20.00 Amazon e-gift card for completing the online survey with <10% missing data. If the submitted survey had  $\geq 10\%$  missing data, the participant was contacted and asked to provide the missing data if he/she was willing to do so.

To obtain a national sample comparable to the Head Start sample, Qualtrics Panel was used. Qualtrics Panel is a web-

based participant recruitment platform that can recruit the most demographically representative sample, as compared to other online recruitment platforms, such as Facebook or Amazon Mechanical Turk.<sup>20</sup> Each member in the Qualtrics Panel received an invitation to participate in the study. Only interested members who passed the study's screening questions were able to complete the online survey. To test the screening and survey questions, a soft launch with 20 participants was conducted. Based on the median soft launch time, an attention filter was added to automatically terminate those who measured at or below one third of the median time to exclude those who did not respond to the survey thoughtfully. A total of 1370 individuals started the survey. Based on the screening questions, 355 (25.9%) were eligible, and 223 (62.8%) completed the study. Based on the responses of the 223 participants, one was excluded due to being 98 years old, and 13 were excluded due to not having a child aged 3–5 years.

## Measures

**Demographics** were assessed by an investigator-developed demographic survey.

**Household food insecurity** was assessed by the 18-item U.S. Household Food Security Survey Module.<sup>21</sup> The scale has good reliability and validity among diverse populations worldwide.<sup>22</sup> The scale includes two components: adult food insecurity (10 items) and child food insecurity (8 items). A higher total raw score indicates a higher level of food insecurity. The total raw score can be grouped into food insecurity (household  $\geq 3$ , adult  $\geq 3$ , child  $\geq 2$ ) and food security (household  $< 3$ , adult  $< 3$ , child  $< 2$ ).

## Mental Well-Being

**Parental stress** was assessed using the 10-item, 5-point Likert Perceived Stress Scale (PSS).<sup>23</sup> The 10-item PSS has been reported to have better reliability and validity than the 14-item PSS.<sup>24</sup> A higher sum score indicates a higher level of stress. Based on the sum score, participants were grouped into low stress (0–13), moderate stress (14–26), and high stress (27–40). In this study, the Cronbach's alpha was 0.82.

**Parental anxiety** was assessed using the 8-item, 5-point Likert Neuro-QoL Anxiety Short Form.<sup>25</sup> It has good internal consistency reliability ( $\alpha = 0.94$ ), test-retest reliability (0.81), convergent validity, and known-group validity.<sup>26,27</sup> A total raw score was calculated and then transformed to the T-scores (mean = 50,  $SD = 10$ ). A high T-score indicates a higher level of anxiety.<sup>25</sup> The scale had a Cronbach's alpha of 0.93 in this study.

**Parental depression** was assessed using the 8-item, 5-point Likert Neuro-QoL Depression Short Form.<sup>25</sup> The Neuro-QoL Depression Short Form has good internal consistency reliability ( $\alpha = 0.96$ ), test-retest reliability (0.82), convergent validity, and known-group validity.<sup>26,27</sup> A total raw score was

calculated and then transformed to the T-scores (mean = 50,  $SD = 10$ ). A higher T-score indicates a higher level of depression.<sup>25</sup> The Cronbach's alpha was 0.95 in this study.

**Child sadness**, referring to child poor mood and negative perceptions of self, the world, and the future, was assessed by the 7-item, 3-point Likert NIH Toolbox Sadness Parent Report Fixed Form.<sup>28</sup> This scale has acceptable internal consistency reliability ( $\alpha = 0.77$ ) and convergent validity (0.38).<sup>28</sup> A total raw score was calculated and then transformed to the uncorrected T-scores (mean = 50,  $SD = 10$ ).<sup>29</sup> A higher T-score indicates a higher level of sadness reported by parents. In this study, the scale had a Cronbach's alpha of 0.87.

**Child fear**, including child fear, worry, and hyperarousal, was assessed by the 6-item, 3-point Likert NIH Toolbox Fear-Over Anxious Parent Report Fixed Form.<sup>28</sup> The scale has acceptable internal consistency reliability ( $\alpha = 0.79$ ) and convergent validity (0.60).<sup>28</sup> A total raw score was calculated and then transformed to the uncorrected T-scores (mean = 50,  $SD = 10$ ).<sup>29</sup> A high T-score indicates a higher level of fear. The Cronbach's alpha was 0.83 in this study.

**Child anger**, defined as child attitudes of hostility and cynicism, was assessed using the 9-item, 3-point Likert NIH Toolbox Anger Parent Report Fixed Form.<sup>28</sup> The scale has good internal consistency reliability ( $\alpha = 0.85$ ) and convergent validity (0.64).<sup>28</sup> A total raw score was calculated and transformed to the uncorrected T-scores (mean = 50,  $SD = 10$ ).<sup>29</sup> A higher T-score indicates a higher level of child anger. The scale had a Cronbach's alpha of 0.87 in this study.

**Child positive affect**, referring to pleasant feelings such as happiness, joy, excitement, enthusiasm, and contentment, was assessed by the 9-item NIH Toolbox Positive Affect Parent Report Fixed Form.<sup>28</sup> The scale has good internal consistency reliability ( $\alpha = 0.92$ ) and convergent validity (0.95).<sup>28</sup> A total raw score was calculated and then transformed to the uncorrected T-scores (mean = 50,  $SD = 10$ ). A higher T-score indicates a higher level of positive affect. In this study, the Cronbach's alpha was 0.94.

## Data Analysis

All data analyses were performed using the IBM SPSS Statistics 26. Study variables were described using means, standard deviations, ranges, frequencies, and percentages. Independent t-test was applied to examine group differences (food insecure group vs food secure group) in parental stress, anxiety, depression, child sadness, fear, anger, and positive affect. To examine the main and interaction effects of adult food insecurity and child food insecurity on both parents' and children's mental well-being, multivariate general linear models were performed by controlling for parents' age, sex, ethnicity, race, marital status, annual family income, employment status, education level, and number of children living in the households. R squared ( $R^2$ ) was the variances of the dependent variable explained by both demographic factors and food insecurity variables. Results with p-value  $< 0.05$  were statistically significant.

**Table 1.** Participants' Demographics ( $N = 408$ ).

Demographics	Total		Head start ( $n = 199$ )		Qualtrics panel ( $n = 209$ )	
	M (range)	SD	M (range)	SD	M (range)	SD
Age	31.10 (18–65)	7.25	30.91 (18–53)	6.20	31.29 (18–65)	8.13
	n	%	n	%	n	%
Sex (female)	356	87.5%	184	92.5%	172	82.7%
Ethnicity (Hispanic)	68	16.7%	23	11.6%	45	21.6%
Race						
White	250	61.3%	117	58.8%	133	63.6%
Black	86	21.1%	48	24.1%	38	18.2%
Mixed/other	72	17.6%	34	17.1%	38	18.2%
Marital status						
Married/partnered	207	50.7%	88	44.2%	119	56.9%
Separated/widowed	53	13.0%	29	14.6%	24	11.5%
Single	148	36.3%	82	41.2%	66	31.6%
Annual income						
< \$20,000	174	42.6%	98	49.2%	76	36.4%
\$20,000–29,999	112	27.5%	50	25.1%	62	29.7%
\$30,000–49,999	97	23.8%	34	17.1%	63	30.1%
≥ \$50,000	25	6.1%	17	8.5%	8	3.8%
Employment						
Full-time	133	32.8%	62	31.3%	71	34.3%
Part-time	94	23.2%	50	25.3%	44	21.3%
Not employed	178	44.0%	86	43.4%	92	44.4%
Education						
≤ High school	158	38.7%	72	36.2%	86	41.1%
Some college	140	34.3%	73	36.7%	67	32.1%
≥ Community college degree	110	27.0%	54	27.1%	56	26.8%
Number of children						
1 child	119	29.2%	32	16.1%	87	41.6%
2 children	123	30.1%	67	33.7%	56	26.8%
3 children	100	24.5%	61	30.7%	39	18.7%
4 or more	66	16.2%	39	19.5%	27	12.9%
Household food insecurity status						
Household food secure	174	42.6%	114	57.3%	60	28.7%
Household food insecure	234	57.4%	85	42.7%	149	71.3%
Adult food insecurity status						
Adult food secure	200	49.0%	130	65.3%	70	33.5%
Adult food insecure	208	51.0%	69	34.7%	139	66.5%
Child food insecurity status						
Child food secure	258	63.2%	151	75.9%	107	51.2%
Child food insecure	150	36.8%	48	24.1%	102	48.8%

## Results

### Demographics

A total of 408 parents participated, with a mean age of 31.10 years (range: 18–65). The majority were female. About 17% were Hispanic, 21% were Black, and 36% were single. Nearly half had a family annual income <\$20,000, 44% were unemployed, and 39% had a high school or lower educational level. On average, each family had 2 children (range: 1–7), with over 16% with 4 children or more living in their household. More

than 57% of the households were food insecure, 51% of parents were food insecure, and 37% of children were food insecure. [Table 1](#) displays the detailed demographics of the participants.

### Food Insecurity and Mental well-Being

As shown in [Table 2](#), parents with food insecurity reported higher levels of stress (21.98 vs 20.36,  $p < .001$ ), anxiety (59.55 vs 57.26,  $p < .001$ ), and depression (55.52 vs 52.76,  $p < .001$ ) than those with food security. Similarly, children with

**Table 2.** Relationship Between Food Insecurity and Mental Well-Being (N = 408).

Outcomes	Total (M ± SD)	Adult food insecure group (M ± SD)	Adult food secure group (M ± SD)	t-statistic	p-value
Parent stress	20.36 ± 6.39	21.98 ± 6.01	18.67 ± 6.34	-5.42	<.001
Parent anxiety	57.26 ± 7.35	59.55 ± 6.69	54.89 ± 7.27	-6.74	<.001
Parent depression	52.76 ± 8.61	55.52 ± 8.29	49.88 ± 7.99	-6.98	<.001
Child sadness	53.70 ± 14.53	57.64 ± 16.43	49.60 ± 10.85	-5.86	<.001
Child fear	52.39 ± 12.64	56.29 ± 13.51	48.34 ± 10.22	-6.72	<.001
Child anger	57.97 ± 12.82	60.09 ± 13.74	55.77 ± 11.40	-3.46	.001
Child positive affect	44.01 ± 12.16	41.70 ± 12.03	46.40 ± 11.86	3.98	<.001
Outcomes		Child food insecure group (M ± SD)	Child food secure group (M ± SD)	t-statistic	p-value
Parent stress		22.03 ± 6.33	19.38 ± 6.23	-4.12	<.001
Parent anxiety		59.94 ± 7.05	55.72 ± 7.08	-5.80	<.001
Parent depression		56.54 ± 7.67	50.56 ± 8.37	-7.18	<.001
Child sadness		60.57 ± 16.72	49.71 ± 11.34	-7.07	<.001
Child fear		57.31 ± 13.23	49.53 ± 11.36	-6.03	<.001
Child anger		61.79 ± 13.43	55.75 ± 11.92	-4.71	<.001
Child positive affect		40.17 ± 12.45	46.24 ± 11.43	5.01	<.001

**Table 3.** Main and Interaction Effects of Adult and Child Food Insecurity on Parents' Mental Well-Being.

Predictor	Stress			Anxiety			Depression		
	B	SE	p-value	B	SE	p-value	B	SE	p-value
Intercept	17.93	1.82	<.001	56.80	2.02	<.001	51.84	2.36	<.001
Age	0.06	0.05	.203	0.05	0.05	.275	0.02	0.06	.674
Sex (male)	-1.54	0.96	.109	-2.22	1.07	<b>.038</b>	-1.09	1.25	.381
Ethnicity (Hispanic)	-0.98	0.86	.256	-0.19	0.95	.839	-0.21	1.12	.852
Race (reference: White)									
Black	-1.91	0.80	<b>.018</b>	-2.26	0.89	<b>.012</b>	-4.17	1.05	<b>&lt;.001</b>
Mixed/other	-2.40	0.85	<b>.005</b>	-1.95	0.95	<b>.040</b>	-3.13	1.11	<b>.005</b>
Marital status (separated/single)	-0.33	0.67	.620	0.02	0.74	.980	0.83	0.87	.339
Education (reference: ≥ community college degree)									
≤ High school	-0.09	0.81	.908	-1.44	0.90	.110	-1.14	1.05	.280
Some college	1.17	0.80	.145	-0.48	0.89	.592	-0.06	1.04	.953
Income (<\$20,000)	-0.46	0.73	.532	-1.54	0.81	.057	-0.58	0.94	.539
Employment (reference: Full-time)									
Not employed	1.07	0.78	.172	1.33	0.87	.127	0.42	1.02	.680
Part-time	0.42	0.85	.626	-0.16	0.95	.868	-0.78	1.11	.479
Number of children	-0.23	0.25	.357	-0.70	0.27	<b>.010</b>	-0.51	0.32	.109
Adult food insecurity	2.65	0.84	<b>.002</b>	3.02	0.94	<b>.001</b>	3.66	1.09	<b>.001</b>
Child food insecurity	1.31	1.52	.389	0.67	1.69	.694	4.61	1.98	<b>.020</b>
Adult and child food insecurity	0.03	1.77	.985	2.02	1.97	.305	-0.90	2.30	.697
R <sup>2</sup>	.133			.184			.193		

food insecurity were reported by parents to have higher levels of sadness (60.57 vs 53.70,  $p < .001$ ), fear (57.31 vs 52.39,  $p < .001$ ), and anger (61.79 vs 57.97,  $p < .001$ ), and a lower level of positive affect (40.17 vs 44.01,  $p < .001$ ) than those with food security. Moreover, children whose parents had food insecurity experienced higher levels of sadness (57.64 vs 49.60,  $p < .001$ ), fear (56.29 vs 48.34,  $p < .001$ ), and anger (60.09 vs 55.77,  $p = .001$ ), and lower levels of positive affect (41.70 vs 46.40,  $p < .001$ ) than those whose parents were food

secure. Likewise, parents whose children were food insecure had higher levels of stress (22.03 vs 19.38,  $p < .001$ ), anxiety (59.94 vs 55.72,  $p < .001$ ), and depression (56.54 vs 50.56,  $p < .001$ ) than those whose children were food secure.

Tables 3 and 4 illustrate the results from the multivariate General Linear Model. After adjusting for all demographics and child food insecurity, parents with food insecurity had significantly higher levels of stress ( $B = 2.65, p = .002$ ), anxiety ( $B = 3.02, p = .001$ ), and depression ( $B = 3.66, p = .001$ ), as well

**Table 4.** Main and Interaction Effects of Adult and Child Food Insecurity on Children's Mental Well-Being.

Predictor	Sadness			Fear			Anger			Positive affect		
	B	SE	p-value	B	SE	p-value	B	SE	p-value	B	SE	p-value
Intercept	54.46	3.98	<.001	52.05	3.53	<.001	54.90	3.74	<.001	44.21	3.53	<.001
Age	-0.04	0.10	.689	0.07	0.09	.398	0.08	0.09	.389	-0.04	0.09	.610
Sex (male)	1.66	2.10	.430	-0.55	1.87	.769	0.72	1.97	.717	0.56	1.86	.764
Ethnicity (Hispanic)	3.54	1.88	.060	0.43	1.67	.798	0.80	1.77	.650	2.76	1.66	.099
Race												
Black	2.83	1.76	.109	0.17	1.57	.915	-4.15	1.66	<b>.013</b>	3.96	1.56	<b>.012</b>
Mixed/other	-1.54	1.87	.411	-1.07	1.66	.519	-2.55	1.75	.147	2.17	1.65	.190
Marital status (separated/single)	0.65	1.47	.655	0.87	1.30	.507	1.86	1.38	.179	-0.32	1.30	.805
Education												
≤ High school	-2.74	1.77	.122	-1.50	1.57	.340	-1.68	1.66	.312	1.65	1.56	.293
Some college	-1.58	1.75	.367	-2.36	1.56	.130	0.13	1.65	.940	2.79	1.55	.073
Income (<\$20,000)	-0.45	1.59	.780	-0.83	1.41	.557	-1.19	1.50	.427	-0.48	1.41	.732
Employment												
Not employed	0.04	1.71	.982	-1.92	1.52	.207	-0.23	1.61	.888	1.07	1.52	.481
Part-time	-1.90	1.86	.308	-2.10	1.66	.206	-1.85	1.75	.293	-0.72	1.65	.665
Number of children	-1.31	0.54	<b>.015</b>	-1.41	0.48	<b>.003</b>	0.06	0.50	.905	0.19	0.48	.692
Adult food insecurity	1.91	1.84	.302	5.03	1.64	<b>.002</b>	0.24	1.73	.889	-0.83	1.63	.612
Child food insecurity	4.08	3.33	.221	2.12	2.96	.474	-0.004	3.13	.999	-1.71	2.95	.563
Adult and child food insecurity	5.26	3.87	.175	2.50	3.44	.467	6.48	3.64	.076	-4.44	3.43	.196
R <sup>2</sup>	.175			.155			.091			.096		

as higher levels of fear in their children ( $B = 5.03, p = .002$ ), than those without adult food insecurity. Similarly, after controlling for all demographics and adult food insecurity, parents with child food insecurity reported having a significantly higher level of depression than those without child food insecurity ( $B = 4.61, p = .020$ ). No significant interaction effects of adult and child food insecurity on parents' or children's mental well-being were found.

Black parents had lower levels of stress ( $B = -1.91, p = .018$ ), anxiety ( $B = -2.26, p = .012$ ), and depression ( $B = -4.17, p < .001$ ) than their White counterparts. Likewise, children with Black parents had a lower level of anger ( $B = -4.15, p = .013$ ) and a higher level of positive affect ( $B = 3.96, p = .012$ ) than children with White parents. Moreover, mixed or other racial parents had lower levels of stress ( $B = -2.40, p = .005$ ), anxiety ( $B = -1.95, p = .040$ ), and depression ( $B = -3.13, p = .005$ ) than their White peers. A larger number of children in the household was associated with lower levels of sadness ( $B = -1.31, p = .015$ ) and fear ( $B = -1.41, p = .003$ ) in children, as well as parents' anxiety ( $B = -0.70, p = .010$ ). Additionally, fathers reported having a lower level of anxiety than mothers ( $B = -2.22, p = .038$ ). The full model explained about 13%, 18%, 19%, 18%, 16%, 9%, and 10% of the variances in parental stress, anxiety, and depression; and child sadness, fear, anger, and positive affect, respectively.

## Discussion

To our knowledge, this study is the first that examined the main and interaction effects of adult food insecurity and child food insecurity on low-income parents' and preschoolers'

mental well-being during the unique COVID-19 pandemic. The results indicate that adult food insecurity was related to parental stress, anxiety, depression, and child fear, while child food insecurity was related to parental depression. Moreover, parental and child mental well-being varied by parents' race and the number of children living in each household. Mothers had a higher level of anxiety than fathers. These results emphasize the negative influence of adult food insecurity and child food insecurity on parents' and preschoolers' mental well-being, signifying the urgent need to improve food security in both groups to promote mental well-being in low-income families.

A previous study in 2018 that focused on low-income Head Start families reported a 46.9% household food insecurity rate,<sup>30</sup> whereas the current study showed a 22% higher rate of 57.4%. The increased rate noted in this study was lower than the increase of nearly 80% from 2018 to 2020 found in a prior study that included predominately Black participants<sup>9</sup>; however, the household food insecurity rate (57.4%) in this study was 1.56 times higher than the rate reported in the prior study (36.9%). The higher household food insecurity rate in this study may be due to the low-income sample. Alarmingly, the adult food insecurity rate increased by 48% from 34.4% in 2018<sup>30</sup> to 51% in 2020. Fortunately, the child food insecurity rate remained somewhat similar to the previous 2018 study (36.8% vs 37.5%). These findings may be due to the COVID-19 Child Nutrition Response Act that modified food programs of the U.S. Department of Agriculture<sup>31</sup> to allow granting nationwide waivers to provide free non-congregate breakfast

and lunch meals seven days a week to all children under 18 years regardless of their socioeconomic status. Therefore, national policy strategies to provide food assistance to families in need may be an effective strategy, although further investigation is warranted to examine long-term effects.

Consistent with prior literature worldwide,<sup>11,12</sup> this study also found positive relationships between adult food insecurity and levels of stress, anxiety, and depression among adults, even after adjusting for sociodemographic factors and child food insecurity. Food insecurity can be a life stressor that increases domestic violence and ultimately leads to unhealthy mental well-being among family members.<sup>32</sup> In addition, this study showed child food insecurity negatively affected parental stress, anxiety, and depression, and only parental depression was significantly related to child food insecurity after adjusting for demographics and parents' food insecurity. Correspondingly, one previous study with 35 Head Start parents found that mothers' perceived distress was influenced more by their children's food insecurity than their own food insecurity.<sup>30</sup> These results highlight the importance of child food security in promoting parents' mental well-being, especially reducing depression.

Unsurprisingly, adult food insecurity significantly increased preschoolers' levels of fear, as children living in food insecure households are more likely to experience physical, emotional, and sexual abuse.<sup>33</sup> Consistently, one prior study found that 3-year-old children had more mental problems when their mothers were food insecure.<sup>14</sup> Parents who are food insecure usually experience higher levels of stress, anxiety, and depression, leading to parental burnout and increased substance abuse.<sup>34</sup> These adverse health conditions can then increase family violence, resulting in increased levels of fear in children.<sup>35</sup> Unfortunately, parents usually underestimate the negative impacts of food insecurity, particularly their own food insecurity, on their children's mental well-being.<sup>36</sup> This situation may be occurring because parents prioritize their children's essential needs, such as food, ahead of their own without realizing that child food insecurity experiences and perceptions are grounded in the whole family system.<sup>37</sup> Therefore, increasing parents' awareness of the negative influence of adult food insecurity on both their own and their children's mental well-being is important to improve food security and mental well-being among low-income parents.

Racial differences in mental well-being may also require consideration. White parents reported higher levels of stress, anxiety, and depression than their Black or other racial peers, after adjusting for food insecurity and other sociodemographic factors. Although substantial evidence indicates that Black adults living in the U.S. are less likely to report depression than their White peers, research supporting these racial differences in stress and anxiety is less consistent.<sup>38,39</sup> However, one recent systematic review including 34 articles found that Black individuals reported higher levels of psychological distress than White individuals in 42 of 45 comparisons,<sup>40</sup>

contradicting this study's results. One possible explanation is that the current study only included parents having a low income, whereas the prior research included adults of all income levels. Perhaps, living with a low income helped the parents build strong resilience to protect them from mental problems.<sup>41</sup> The current study also found that children with Black parents had a lower level of anger and a higher level of positive affect than children with White parents. This result suggests that the "Black-White paradox in mental health" exists in both adults and young children, demonstrating an intergenerational pattern of mental health problems.

No conclusive explanation was found for the "Black-White paradox in mental health." One plausible explanation is the "Superstrong Black Mother" theory. Due to a long history of living with racial discrimination and poverty, Black parents, especially mothers, have learned to build sturdy stress resilience to protect their children from institutional racism and discrimination.<sup>42</sup> To further support this notion, one study found that when facing the same level of adverse childhood experience, Black adults responded with lower levels of depression than White adults<sup>43</sup>; and White adults were one third time less likely to be psychologically resilient than Asian Americans.<sup>44</sup> Moreover, family resilience usually has greater effects on reducing parental stress in Black parents, compared to White or Hispanic parents.<sup>45</sup> Overall, this "Black-White paradox in mental health" indicates that Black individuals are "psychologically resilient" but "physically vulnerable."<sup>46</sup> In other words, although White individuals are "physically healthy," they are more vulnerable to suffer from mental health problems particularly during this worldwide COVID-19 pandemic. As a result, various services and forms of assistance need to be available to help White parents manage their mental health problems and build psychological resilience during or after this current COVID-19 pandemic to promote both parents' and children's mental well-being.

Interestingly, children's levels of sadness and fear, as well as parents' anxiety levels, were significantly lower in families with more children, after controlling for other demographics and food insecurity. This finding may have resulted because during the pandemic "lockdowns" (government requirements to stay at home), children with more siblings had peers to play with, and older siblings were able to provide childcare to younger siblings. This situation may have helped to reduce parents' levels of anxiety. Moreover, literature also supports that having an increased number of children can help reduce older parents' risk of mental health problems.<sup>47</sup> These findings reflect the importance of personal interaction in promoting children's and adults' mental well-being. Due to the widespread public daycare and school closures occurring during the pandemic, children lost the opportunity to learn and interact with peers in school, which may negatively impact the overall mental well-being of the next generation.<sup>48</sup> Moreover, a rapid evidence review found that many children continued leaving home to mix with other children during the school closure, which may have limited the effects of the school

closure on controlling disease transmission.<sup>49</sup> Therefore, more effective strategies are needed to respond to any type of pandemic, and children's well-being and education should be the highest priority in any national strategic plan. Consistent with prior literature,<sup>50</sup> this study reported that fathers had a lower level of anxiety than mothers. This finding may have occurred because men are usually two times more likely to be psychologically resilient than women.<sup>44</sup> However, continued research is needed to support this contention.

This study provides an important foundation for studying the main and interaction effects of adult food insecurity and child food insecurity on both parents' and children's mental well-being, but the cross-sectional nature of the data does not allow for identifying any causal relationship. Self-reported online surveys were completed by parents to avoid in-person interactions due to the COVID-19 pandemic, possibly resulting in social desirability and recall bias. Given the young age of the children who participated in the study, it is possible that parents may have under- or over-estimated their children's mental well-being. Objective measures, such as cortisol testing, to assess preschoolers' mental well-being are recommended in future studies. Moreover, the study participants were recruited by email from one urban and one rural Head Start organization and online via the Qualtrics Panel. This approach may have resulted in a sample that does not represent low-income families with very limited Internet access or literacy levels. Despite these limitations, the study's results underscore the importance of reducing food insecurity in both parents and children as a whole family system to promote the mental well-being of families. Moreover, White mothers with fewer children are more susceptible to mental health problems during "lockdowns," so helping these mothers to build psychological resilience is critically important to foster a healthy and happy family environment for their children.

### So What? Implications for Health Promotion Practitioners and Researchers

#### What Is Already Known on This Topic?

The COVID-19 pandemic has exacerbated food insecurity and mental health problems among low-income family members.

#### What Does This Article Add?

This study is the first to examine the main and interaction effects of adult food insecurity and child food insecurity on low-income parents' and preschoolers' mental well-being. The relationships between socio-demographic factors and mental well-being were also examined.

What are the Implications for Health Promotion Practice or Research?

Results from this study underscore the importance of reducing food insecurity in both parents and children as a whole family system to promote mental well-being of low-income families. Moreover, given the "Black-White paradox in mental health" and White mothers with fewer children are more susceptible to mental health problems during "lockdowns," helping these mothers to build psychological resilience is critically important for promoting mental well-being in a pandemic environment.

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### Author Contributions

Jiying Ling contributed to the study conceptualization and design, data collection and analyses, and drafted the manuscript.

Paige Duren drafted the purpose section.

Lorraine Robbins conducted a critical review and revision.

All authors approved the version to be published.

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