Associations of Household Structure and Presence of Children in the Household with Mental Distress during the COVID-19 Pandemic

Emily Smail, BSc¹, Kira Riehm, MSc¹, Cindy Veldhuis, PhD², Renee M. Johnson, PhD¹, Calliope Holingue, PhD^{1,3}, Elizabeth Stuart, PhD¹, Luke Kalb, PhD^{1,3}, Johannes Thrul, PhD^{1,4}

1. Department of Mental Health, Bloomberg School of Public Health, Johns Hopkins University; 624 N Broadway, Baltimore, MD 21205, USA
2. School of Nursing, Columbia University; 560 W 168th Street, New York, NY 10032, USA
3. Department of Neuropsychology, Kennedy Krieger Institute, Johns Hopkins University; 707 N Broadway, Baltimore, MD 21205, USA
4. Centre for Alcohol Policy Research, La Trobe University, Plenty Rd &, Kingsbury Dr, Bundoora VIC 3086, Australia

Corresponding author: Emily Smail; 624 N Broadway, Room 897, Baltimore, MD 21205, esmail1@jhu.edu

Abstract

Purpose: The objectives of the current study were to: (1) assess the impact of household structure (i.e. living alone compared to living with children, a partner, or both) and presence of children on mental distress during the COVID-19 pandemic; and (2) determine whether these associations are moderated by income or sex.

Results: A total of 2,524 adults aged 25-55 were included in the analytic sample. Multivariable linear regression models were used to examine associations between explanatory variables and mental distress, measured via the Patient Health Questionnaire (PHQ)-4. In adjusted models, each additional child under the age of 12 was associated a decrease in mental distress ($\beta=-0.21$, $p=0.03$). This finding was significant when adjusting for sociodemographic variables (age, sex, race, education, household income, living with a partner, and currently having a job) and historical depressive symptoms (CESD-8). Having children between the ages of 13 and 18 and household structure were not significantly associated with mental distress.

Conclusion: This study supports prior literature that demonstrates the positive association of childrearing with psychological well-being, and suggests that these benefits may be present even under stay-at-home orders in the COVID-19 pandemic.

Keywords: mental distress; COVID-19; family structure; parenting paradox

Introduction

The emergence of COVID-19 in the United States has created unprecedented challenges that have rendered many individuals financially unstable (Goodell, 2020) and emotionally vulnerable (Li et al., 2020). The well-being of families may be particularly at risk as a result of changes in relationships and routines during COVID-19, which may disproportionately affect children's coping abilities and parental burden (Prime, Wade, & Browne, 2020; Russell, Hutchison, Tambling, Tomkunas, & Horton, 2020). Although emerging evidence suggests that there has been a rise in mental distress throughout the pandemic (Kirzinger, Kearney, Hamel, & Brodie, 2020), there is not, to our knowledge, any existing research on the association between household structure and mental distress. Understanding these associations is key to informing public health planning efforts.

Recent polls have highlighted the distressing nature of the pandemic (Holingue, Kalb, & Riehm, In Press). Data from the Kaiser Family Foundation poll found that nearly half of adults in the US are experiencing negative mental health effects from worry and stress over the virus (Kirzinger et al., 2020; McGinty, Presskreischer, Han, & Barry, 2020). The COVID-19 pandemic has increased the amount of time that many adults are spending at home, which could have varying implications for mental health depending on household structure, such as living with children, partners, both, or neither. People living alone may be particularly at risk for experiencing loneliness during the COVID-19 pandemic (McGinty et al., 2020). Among young (ages 16-34) and middle-aged (ages 35-59) adults, living alone has been associated with an increased risk for common mental disorders (Jacob, Haro, & Koyanagi, 2019), including a nearly two-fold increase in anxiety and depressive disorders, compared to those who are married or cohabiting (Joutsenniemi, Martelin, Martikainen, Pirkola, & Koskinen, 2006). Families with

children may also be disproportionately affected as most daycares and almost every school across the US has closed. Classes have shifted to home-based, distance-learning models, affecting nearly 55 million students in kindergarten through 12th grade (Golberstein, Wen, & Miller, 2020). In addition to everyday parenting, many parents quickly assumed the role of primary educator while potentially balancing competing demands from employment. The experience of COVID-19 related stressors, coupled with symptoms of anxiety and depression, has been linked to higher parental perceived stress (Brown, Doom, Lechuga-Pena, Watamura, & Koppels, In Press.; Spinelli, Lionetti, Pastore, & Fasolo, 2020).

Notably, however, having children in the home can be associated with both positive and negative mental outcomes. This phenomenon is known as the parenting paradox ; though (Rizzo, Schiffrin, & Liss, 2013) childcare is demanding and time-consuming, parents tend to value their time with children as it promotes familial connectedness and has high intrinsic value for the parent (Bianchi, Robinson, & Milkie, 2006). The latter is particularly true of interactive childcare, such as playing with a child, as opposed to routine care such as feeding or bathing a child (Offer, 2014). Previous research highlights that the type of interaction may be highly gendered (McDonnell, Luke, & Short, 2019) and may have discrete implications for wellbeing by the sex of the parent. For example, routine childcare is more stressful and less engaging for mothers than it is for fathers (Offer, 2014) and these associations may further depend on the age of the child (Roeters & Gracia, 2016). Stress levels for other forms of childcare are comparable among parents of both genders. Thus, studies investigating associations between caregiving for children during the COVID-19 pandemic and mental distress should account for sex of the parent.

The stresses of childrearing are likely amplified among single parents, partially due to lower levels of financial and emotional support (Sobolewski & King, 2005). These lower levels of support may result in poorer mental health for single parents compared to parents who are married or cohabiting (Crosier, Butterworth, & Rodgers, 2007). These challenges may be particularly relevant during the COVID-19 pandemic, as single parents may be unable to rely on supportive family and friends throughout shelter-in-place orders.

Finally, income inequalities have repeatedly been linked to psychological outcomes (Patel et al., 2018; Pickett, James, & Wilkinson, 2006). These inequalities are likely to be widened during the COVID-19 pandemic as a result of job loss (U.S. Department of Labor, 2020). Indeed, data from a recent poll suggest that individuals belonging to a low-income household (less than \$40,000 per year) have disproportionately experienced negative impacts to their mental health during the COVID-19 pandemic compared to those who make \$40,000 or more (Kirzinger et al., 2020).

As the world enters a new phase with COVID-19, many novel stressors are emerging. Families are faced with particular challenges of additional child rearing and educational duties and people who live alone may experience distress due to isolation. The added responsibilities of childcare may be particularly distressing for women, who have historically provided the bulk of care. Further, households with low economic resources may experience high levels of stress, and the financial effects may compound stress differently based on household structure. To our knowledge, however, no research has examined mental distress and household structure during the pandemic. To address this gap, the objectives of this study are to: (1) assess the impact of household structure (i.e. living alone compared to living with children, a partner, or both) and

presence of children on mental distress during the COVID-19 pandemic; and (2) determine whether these associations are moderated by income or sex.

Methods

Study Sample

Data for this study come from the Understanding America Study (UAS). UAS participants were selected using Address Based Sampling (ABS), in which postal records are used to select a random sample from a listing of residential addresses (Lavrakas, 2008). Eligible individuals include adults 18 and older in the contacted households. The UAS panel consists of 10 nationally representative cohorts (the University of Southern California, 2020) enrolled in the sample between 2014 and 2020. The current analysis uses data from the UAS 235 wave (April 2020 Monthly Survey, administered April 1st through April 28th), which assesses participant responses to the COVID-19 pandemic. Survey weights in the UAS align sample distributions of key demographic characteristics (e.g., sex, race/ethnicity) to their population counterparts based on the Basic Monthly Current Population Survey (CPS).

Measures

Mental Distress

The primary outcome measure was the 4-item version of the Patient Health Questionnaire (PHQ-4). This measure is a brief self-report questionnaire consisting of 2 items that assess depressive symptoms and 2 items that assess anxiety symptoms over a two-week period (Löwe et al., 2010). Response options include “not at all,” “several days,” “more than half the days,” and “nearly every day.” The total score is calculated by adding the scores of all 4 items; higher scores represent greater levels of mental distress (Kroenke, Spitzer, Williams, & Lowe, 2009).

Historical Depressive Symptoms

In earlier waves of data collections, participants completed the 8-item version of the Center for Epidemiologic Studies-Depression Scale (CESD-8) (Bracke, Levecque, & Van de Velde, 2008; Radloff, 1977). Answers range from 0 (none or almost none of the time) to 3 (all or almost all the time). The number of symptoms (count: 0-8) a respondent previously endorsed as occurring “all or almost all the time” in the past 7 days was used as a historical measure of depressive symptoms. The most recent CESD-8 was used for participants with multiple CESD-8 measurements from prior waves (46% of the sample had CESD-8 from June 2019, 36% from June 2017, and 18% from May 2015). Continuously measured CESD-8 scores were included as a covariate in all models.

Household Variables

The primary exposure of interest was household structure, which was assessed using the respondent-reported relationships of household members. Household structure was assigned to the following categories: living alone; living with spouse only; living with children only; living with spouse and children only; living with significant other only; living with significant other and children only. All other combinations of household structure (22.7% of households), including extended family and non-family members, were not assessed due to the heterogeneity of this population. In addition, household structure was further characterized by identifying the number of children living in the household. Children were split into two age groups, children aged 12 or below (range: 0-6) and children aged 13 to 18 (range: 0-4).

Other Sociodemographic Items

Sociodemographic factors included: age category (in years); sex (female or male); race/ethnicity [White, Black or African American, or Other (includes American Indian or Alaska

Native, Asian, Native Hawaiian or Pacific Islander, and multiracial)]; education (high school degree or below, attended some college or received a two-year degree, Bachelor's degree, or graduate degree); household income, measured as the total combined 12-month income of all members currently living the respondent's household (less than 30k, 30-59k, 60k and above); and currently have a job (yes or no). A household income of \$60,000 was selected as the cutoff for low versus high income as it roughly corresponds to the median income in the U.S. in 2018 (Guzman, 2019).

Statistical Analyses

Multivariable, survey-weighted linear regression was used to examine the associations of household characteristics (i.e., household structure and number of children) as explanatory variables and total PHQ-4 score as the outcome. The analysis was restricted to individuals with complete information on all analytic variables between the ages of 25 and 55 (48 participants [~2%] excluded for incomplete data). Age restrictions were implemented to reduce confounding by age; age categories (by decade, beginning at age 25) were selected if greater than one-third of the group had children in the home. We then estimated two additional models with an interaction term of each primary predictor (household structure and number of children) with sex and household income separately.

Sensitivity analyses were included to allow for potentially different results based on distinct ways of measuring a key construct (i.e., household income versus COVID-related financial instability), threshold (i.e., cutoff for low income), similarities of living situation (i.e., living with spouse and living with significant other) and comparison group (i.e., living alone versus living with spouse only as reference group in the household structure model and adjusting for caregiving among individuals with children in the model assessing number of children). All

analyses used the UAS survey weights and adjusted for within-household clustering, allowing these results to generalize to the US adult population. All analyses were performed in Stata 15 using the *svy* commands (Statacorp, 2017).

Results

Sample Description

A total of 2,524 adults, ages 25-55, were included in this analysis. The majority of the participants were female (53%), white (76%), currently working (66%), and living with a partner (73%). Most had some post-secondary education (65%) and an annual income of greater than \$60,000 (52%). CESD-8 total scores ranged from 0 to 8 with a mean of 1.9 (SE=0.062). Over one-third of participants endorsed no CESD-8 symptoms at their most recent measurement, and only 20% reported experiencing more than 3 of the symptoms. Sample characteristics are presented in Table 1. PHQ-4 total scores ranged from 0 to 12 with a mean of 2.9 (SE=0.091). Though the majority of participants (55%) fell within normal levels of distress, many participants reported mild (26%), moderate (11%), and severe (8%) levels of distress.

Correlates of Mental Distress

Unadjusted Analyses

In unadjusted bivariate tests, neither of the primary predictor variables (i.e., household structure and number of children, stratified by age) were associated with mental distress (i.e., PHQ-4 total scores). Prior CESD-8 scores were associated with higher mental distress ($p<0.05$). Higher income and currently having a job had a negative association with mental distress ($p<0.001$). Older age (45-55 compared to 25-34), being male, and being Black/African American (compared to White) were associated with significantly lower lower mental distress (all $p<0.005$) in the unadjusted models.

Adjusted and Stratified Analyses

In adjusted models, compared to households with no children, each additional child under the age of 12 was associated a decrease in mental distress ($\beta=-0.21$, $p=0.03$) (Table 2, Figure 1). This finding was significant when adjusting for sociodemographic variables (age, sex, race, education, household income, living with a partner, and currently having a job) and historical CESD-8 score. Having children between the ages of 13 and 18, number of household members, and household structure were not significantly associated with mental distress. The strength of association and significance of other variables varied across models (household structure and number of children), but generally, being female, currently not working, and historical depressive symptoms were associated with higher levels of mental distress. Black/African American, compared to White individuals, had significantly lower mental distress in all models ($\beta=-1.06$, $p<0.001$). A summary of these results is available in Table 2. Additional models included interaction terms between the primary exposures (i.e., household structure and number of children) and sex and income to investigate differential effects among men/women and high/low income groups. These interaction effects were not statistically significant. A summary of these results is available in Tables 3 and 4.

Sensitivity Analyses

Results did not change when using a COVID-related indicator of financial instability (“In the past seven days, were you worried you would run out of food because of a lack of money or other resources?”), though responding “yes” to this question significantly influences PHQ-4 score ($B=2.25$, $p<0.001$ in unadjusted models). Additionally, using other household income cutoffs (i.e., \$30k, \$50k) and other reference categories for household structure (e.g., living with spouse versus living alone) did not change the results. Similarly, combining categories of

comparable living situations, namely, living with spouse and living with significant other and living with spouse or significant other and children, did not change the association with total PHQ-4 score.

Discussion

Our findings, based on data collected during the April 2020 wave of a nationally representative survey panel, found no significant differences in mental distress in individuals living alone compared to individuals living with family members or significant others (e.g., spouse or spouse and children). This finding is consistent with early literature that proposes no differences in mental health symptoms based on household structure (Cramer, 1993), but is in contrast to recent studies that suggest that individuals living alone fare worse than those living with others (Jacob et al., 2019). It may be that individuals living alone have found unique ways to stay connected during this time (e.g., virtual hangouts, socially distant walks in the park, etc.) that provide buffers against worsened mental health. Alternatively, people living alone may be less concerned about exposing friends and family to the virus, which has been identified as a significant source of anxiety, particularly among healthcare workers (Shanafelt, Ripp, & Trockel, 2020). Relatedly, people living alone may be able to practice social distancing more conscientiously than those living with others, which could serve as a source of relief.

This study suggests that having children ages 12 and under in the household is associated with lower mental distress, whereas having children ages 13 to 18 in the household is not associated with mental distress. Findings for this study are consistent with previous literature which suggest that parents experience high levels of well-being when spending time caring for young children (Roeters & Gracia, 2016). This may be true particularly during the stay-at-home orders, which were enacted almost ubiquitously across all 50 states in April. Many parents were

able to spend additional time with their children, and, as a result of the caregiving responsibilities, were prompted to implement practices that are known to be beneficial to mental health and resilience, including routine breaks from work, establishing a schedule, improving and increasing communication, and engaging in activities as a family (Prime et al., 2020). For families with dual parents, childcare and household tasks may be more collaborative than before the pandemic, which may also improve wellbeing. Having a family is associated with an increased sense of purpose and responsibility for parents which has positive impacts on mental and physical health (Pollitt, Robinson, & Umberson, 2018). These effects may be enhanced during the pandemic as a result of increased time spent with children and the need to provide support and a sense of normalcy for children during a highly stressful time.

It is important to note, however, that these effects may not be universally experienced by parents. Recent studies have shown that the impact of COVID-19 among parents varies with caregiver burden, perceptions of children's stress (Russell et al., 2020), and the availability of resources to meet caregiver needs (Griffith, 2020). Therefore, while this study shows that young children, on average, are associated with reduced mental distress among parents, there are likely nuances in the experience of mental distress among parents as a result of these factors and other characteristics of family and work structure (e.g., age of children, flexibility of job, support system).

Not surprisingly, parents of adolescents are less likely to engage in caregiving activities as children in this age range are increasingly autonomous. While some earlier studies have suggested that rising parent-child tension in adolescence cause parental distress (Laursen, Coy, & Collins, 1998), there is little empirical evidence showing child-induced distress. Prior studies have suggested numerous possibilities for this lack of evidence, including inter-person variability

in the experience of demands and rewards of childrearing and the notion that rewards and burdens of childrearing offset each other (Umberson, Pudrovska, & Reczek, 2010). Further, recent evidence suggests that parents and non-parents have experienced similar levels of disruption to their daily lives during the COVID-19 pandemic (Kirzinger et al., 2020); however, the survey did not take into account age differences of children. It may be that disruption of daily life for parents with children aged 13 to 18 are more comparable to individuals without children in the home, in terms of added childcare and schooling activities, than parents with children at or below the age of 12.

These data showed no significant interaction of the primary predictor variables (e.g., household structure and number of children) with past-year household income (less than/greater than \$60,000) or sex (female/male), suggesting that the association between household structure and mental distress does not vary by sex or income. In addition, the data showed no main effects of income. There are many plausible explanations for these findings. For example, self-report of household income is prone to measurement error (Moore & Welniak, 2000) and may not accurately represent one's actual household income, particularly during the COVID-19 pandemic. Further, there is substantial variation in household size (between 0 and 11 housemates reported in this population of UAS participants). As expected, a livable income for one household may not be equivalent to the livable income of another. The COVID-related financial distress variable is thought to capture some of these nuances, asking whether a participant is worried about running out of food. Given the lack of association between mental distress and this financial variable in adjusted models, it may be possible that individuals are encountering fewer expenses during the pandemic (e.g., eating out less, travelling less) (Nicola et al., 2020), which may counter some of the concern brought about by financial insecurity.

Regarding sex differences, the data show that men, on average, have lower distress scores than females. This reflects general trends of depression and anxiety (Altemus, Sarvaiya, & Neill Epperson, 2014), and the recent finding that women report disproportionate worry over coronavirus-related concerns (Frederiksen, Gomez, Salganicoff, & Ranji, 2020). Anecdotally, many sources hypothesize that men may be taking on additional household responsibilities during the pandemic, including routine caregiving and household chores (Carlson, Petts, & Pepin, 2020; Levs, 2020; Miller, 2020). More research is needed to determine whether gendered divisions of labor have shifted during the pandemic and if so, whether these have associations with mental health.

Despite many strengths, such as the use of a nationally representative study population, this study is not without limitations. Foremost is the cross-sectional design of the study, which implies that no conclusions can be drawn on the directionality of associations. However, we were able to control for depressive symptoms for a previous wave of the UAS in all analyses. Second, we lacked data on relationship quality, marital satisfaction, and child mental health, which could mediate the association between household variables and mental distress. Investigating these potential mediators is an important direction for future studies.

This study supports previous research suggesting positive effects of childrearing and demonstrates that parents with young children may be particularly likely to experience these benefits (e.g., increased likelihood of taking routine breaks from work, spending time outside, and having set wake and bedtime schedules) (Craig & Churchill, 2020) during a stay-at-home order. Engaging in these physical and emotional activities, which come naturally with childcare, may also facilitate mental well-being among those not currently providing care. Lack of evidence for differences in mental distress in those living alone versus those living with others

could signal a uniform response to stress and uncertainty, though further evidence is necessary to confirm this finding. These data are unique in that they capture mental health of the U.S. population approximately one month into the U.S. response to the pandemic at a time when nearly all schools were closed, and all states were under stay-at-home orders. As more data are published, it will be essential to understand the long-term consequences of specific living situations on mental health in order to inform recommendations and practices during these unique times.

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Table 1: Participant characteristics among UAS sample ages 25-55

Total Sample (N=2524)		
<i>Sociodemographic Characteristics - N (%)</i>		
Age		
	25-34	773 (30.6%)
	35-44	985 (39.0%)
	45-55	766 (30.4%)
Sex		
	Female	1337 (53.0%)
	Male	1187 (47.0%)
Race		
	White	1921 (76.1%)
	Black	320 (12.7%)
	Other	284 (11.2%)
Education Level		
	High school or less	879 (34.8%)
	Some college or Associate's degree	650 (25.8%)
	Bachelor's degree	556 (22.0%)
	Graduate degree	439 (17.4%)
Household Income		
	Less than 30k	606 (24.0%)
	Less than 60k	597 (23.7%)
	60k+	1320 (52.3%)
Currently working		
	Yes	1665 (66.0%)
	No	859 (34.0%)
Living with a Partner		
	Yes	1839 (72.9%)
	No	685 (27.1%)
Household structure		
Household Structure – N (%)		
	Alone	313 (12.4%)
	Living with Spouse	345 (13.6%)
	Living with Kids	125 (5.5%)
	Living with Spouse and Kids	888 (35.1%)
	Living with Significant Other (SO)	145 (5.6%)
	Living with SO and Kids	135 (5.2%)
	Other	573 (22.6%)
Number of Children – mean (se)		
	Ages 0-12	0.7 (0.031)
	Ages 12-18	0.3 (0.016)
<i>Mental Distress - mean (se)</i>		
PHQ-4 Score		2.9 (0.091)
Latest CES-D score		1.9 (0.062)

Table 2: Multivariable linear regression models estimating PHQ-4 total score by 1) household structure and 2) number of children in the household, stratified by age of children. Both models are adjusted for age, sex, race, education, household income, current work status, living with a partner, and historical depressive symptoms

Outcome: Primary Predictor:	Mental Distress		Metal Distress	
	Household structure		Number of children (by age)	
	(N=1951)		(N=2524)	
	<i>Beta</i>	<i>95% CI</i>	<i>Beta</i>	<i>95% CI</i>
Household structure (ref: alone)				
Spouse Only	0.14	[-0.54, 0.83]	-----	-----
Kids Only	-0.11	[-0.90, 0.67]	-----	-----
Spouse and Kids	0.06	[-0.50, 0.61]	-----	-----
Significant other only	0.25	[-0.53, 1.03]	-----	-----
Significant other and kids	0.01	[-1.06, 1.09]	-----	-----
Number of children				
# children <-12	-----	-----	-0.21	[-0.40, -0.02]
# children 13-18	-----	-----	0.00	[-0.27, 0.26]
Age				
35-44	-0.13	[-0.64, 0.37]	-0.09	[-0.53, 0.35]
45-55	-0.43	[-0.91, 0.05]	-0.45	[-0.89, -0.00] *
Sex (ref: female)				
Male	-0.45	[-0.83, -0.06] *	-0.31	[-0.67, 0.04] *
Race (ref: white)				
Black	-1.06	[-1.67, -0.45] *	-1.06	[-1.59, -0.53] *
Other	-0.17	[-0.76, 0.43]	-0.29	[-0.77, 0.19]
Education (ref: high school or less)				
Some college/Associate's	-0.03	[-0.55, 0.48]	-0.03	[-0.48, 0.42]
Bachelor's	0.61	[0.09, 1.13] *	0.47	[-0.00, 0.95]
Graduate degree	0.56	[-0.06, 1.17]	0.37	[-0.20, 0.95]
Household Income (ref: <30k)				
30 to less than 60k	-0.27	[-0.94, 0.40]	-0.08	[-0.65, 0.50]
60k+	-0.44	[-1.14, 0.26]	-0.14	[-0.73, 0.44]
Current job (ref: Yes)				
No job	0.55	[0.04, 1.05] *	0.68	[0.24, 1.12] *
Live with partner (ref: no)				
Living with partner	-----	-----	0.05	[-0.41, 0.51]
Historical depression score (CESD-8)	0.48	[0.37, 0.59] *	0.50	[0.41, 0.59] *

*denotes significance at a $p < 0.05$ level

Fig. 1 Predicted PHQ-4 score and 95% confidence interval by number of children in the household, stratified by age of children and adjusted for age, sex, race, education, household income, current work status, living with a partner, and historical depressive symptoms

Table 3: Multivariable linear regression models with interaction terms estimating PHQ-4 total score by 1) household structure and 2) number of children in the household, stratified by age of children, and their interaction with sex. Both models are adjusted for age, race, education, household income, current work status, living with a partner, and historical depressive symptoms

Outcome: Primary Predictor:	Mental Distress		Metal Distress	
	Household structure		Number of children (by age)	
	(N=1951)		(N=2524)	
	Beta	95% CI	Beta	95% CI
Household structure (ref: alone)				
Spouse only	0.00	[-0.91, 0.91]	-----	-----
Kids only	0.04	[-0.96, 1.04]	-----	-----
Spouse and kids	0.40	[-0.42, 1.22]	-----	-----
Significant other only	0.83	[-0.42, 2.09]	-----	-----
Significant other and kids	0.13	[-1.14, 1.40]	-----	-----
<i>Household structure by sex interaction</i>				
Spouse only & Male	0.30	[-1.09, 1.69]	-----	-----
Kids only & Male	-0.11	[-2.10, 1.87]	-----	-----
Spouse and kids & Male	-0.63	[-1.76, 0.50]	-----	-----
Significant other only & Male	-1.09	[-2.71, 0.53]	-----	-----
Significant other and kids & Male	-0.07	[-2.26, 2.13]	-----	-----
Number of children				
# children <-12	-----	-----	-0.13	[-0.39, 0.13]
# children 13-18	-----	-----	0.11	[-0.27, 0.49]
<i>Number of children by sex interaction</i>				
# children <-12 & Male	-----	-----	-0.16	[-0.47, 0.15]
# children 13-18 & Male	-----	-----	-0.25	[-0.75, 0.24]
Age				
35-44	-0.13	[-0.64, 0.38]	-0.07	[-0.51, 0.37]
45-55	-0.41	[-0.89, 0.07]	-0.42	[-0.87, 0.02]
Sex (ref: female)				
Male	-0.12	[-1.13, 0.90]	-0.14	[-0.61, 0.32]
Race (ref: white)				
		[-1.62, -0.41]		
Black	-1.01	*	-1.04	[-1.57, -0.51] *
Other	-0.15	[-0.74, 0.43]	-0.29	[-0.77, 0.19]
Education (ref: high school or less)				
Some college/Associate's	-0.05	[-0.57, 0.47]	-0.03	[-0.48, 0.42]
Bachelor's	0.58	[0.06, 1.09] *	0.47	[-0.01, 0.95]
Graduate degree	0.54	[-0.07, 1.15]	0.38	[-0.19, 0.95]
Household Income (ref: <30k)				
30 to less than <60k	-0.3	[-0.98, 0.39]	-0.08	[-0.66, 0.49]
60k+	-0.44	[-1.16, 0.28]	-0.15	[-0.73, 0.43]
Current job (ref: Yes)				
No job	0.51	[-0.00, 1.03]	0.63	[0.18, 1.08] *

Live with partner (ref: no)				
Living with partner	-----	-----	0.07	[-0.39, 0.52]
Historical depression score (CESD-8)	0.47	[0.36, 0.59] *	0.5	[0.41, 0.59] *

*denotes significance at a p<0.05 level

4: Multivariable linear regression models with interaction terms estimating PHQ-4 total score by 1) household structure and 2) number of children in the household, stratified by age of children, and their interaction with household income. Both models are adjusted for age, race, sex, education, current work status, living with a partner, and historical depressive symptoms

Outcome: Primary Predictor:	Mental Distress		Metal Distress	
	Household structure		Number of children (by age	
	(N=1951)		(N=2524)	
	Beta	95% CI	Beta	95% CI
Household structure (ref: alone)				
Spouse only	-0.24	[-1.45, 0.97]	-----	-----
Kids only	-0.22	[-1.25, 0.80]	-----	-----
Spouse and kids	-0.27	[-1.16, 0.62]	-----	-----
Significant other only	-0.01	[-1.39, 1.36]	-----	-----
Significant other and kids	0.02	[-1.51, 1.55]	-----	-----
<i>Household structure by income interaction</i>				
Spouse only & Low income	0.55	[-0.91, 2.00]	-----	-----
Kids only & Low income	0.15	[-1.24, 1.54]	-----	-----
Spouse and kids & Low income	0.44	[-0.65, 1.53]	-----	-----
Significant other only & Low income	0.41	[-1.22, 2.05]	-----	-----
Significant other and kids & Low income	-0.24	[-2.06, 1.59]	-----	-----
Number of children				
# children <-12	-----	-----	-0.27	[-0.63, 0.09]
# children 13-18	-----	-----	0.27	[-0.25, 0.79]
<i>Number of children by income interaction</i>				
# children <-12 & Low income	-----	-----	0.08	[-0.32, 0.48]
# children 13-18 & Low income	-----	-----	-0.41	[-1.01, 0.18]
Age				
35-44	-0.13	[-0.64, 0.37]	-0.11	[-0.55, 0.33]
45-55	-0.45	[-0.93, 0.04]	-0.45	[-0.89, -0.00] *
Sex (ref: female)				
Male	-0.44	[-0.83, -0.06] *	-0.32	[-0.66, 0.03]
Race (ref: white)				
Black	-1	[-1.61, -0.38] *	-1.05	[-1.58, -0.52] *
Other	-0.12	[-0.71, 0.46]	-0.27	[-0.75, 0.21]
Education (ref: high school or less)				
Some college/Associate's	-0.11	[-0.63, 0.42]	-0.06	[-0.51, 0.39]

Bachelor's	0.51	[0.01, 1.02] *	0.42	[-0.04, 0.89]
Graduate degree	0.46	[-0.12, 1.04]	0.31	[-0.22, 0.85]
Household Income (ref: $\geq 60k$)				
Less than 60k	-0.41	[-1.35, 0.53]	0.06	[-0.44, 0.56]
Current job (ref: Yes)				
No job	0.61	[0.12, 1.09] *	0.71	[0.31, 1.12] *
Live with partner (ref: no)				
Living with partner	-----	-----	0.04	[-0.41, 0.49]
Historical depression score (CESD-8)	0.49	[0.38, 0.60] *	0.5	[0.41, 0.59] *

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*denotes significance at a $p < 0.05$ level