MATERNAL CHILDHOOD ADVERSITY AND THE EFFECT OF COVID-19 ON MENTAL HEALTH OUTCOMES

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MATERNAL CHILDHOOD ADVERSITY AND THE EFFECT OF COVID-19 ON MENTAL HEALTH OUTCOMES

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Abstract: This study investigates the role of adverse childhood experiences (ACEs) in depression and perceived stress reported among mothers of young children following the onset of the COVID-19 pandemic (May 2020). The COVID-19 pandemic and emergency responses have been widely associated with increased mental health issues. The effects of the pandemic and social distancing measures were particularly concerning for mothers, who were under relatively more stress due to the implications for primary caregivers. Additionally, the COVID-19 pandemic disproportionately affected low-income and minority populations, who may not have had the resources to alleviate health or economic problems. Maternal mental health is critical for healthy child development and has long-term implications for individuals and families. The mothers in this sample (N = 113) were recruited from two prenatal clinics in the South-Central United States in 2017-2018 and have since participated in up to nine waves of online data collection. Initial assessments measured demographic variables and Adverse Childhood Experiences (ACE) scores. The eighth wave of data collection, administered in May 2020, measured depression and perceived stress scores, in addition to asking about pandemic-related stressors (e.g., loneliness, economic insecurity, and health concerns). Linear regression analyses showed number of maternal ACEs to be significantly associated with perceived stress (b = .48, p < .05) and depression (b = .88, p < .05) scores. Loneliness scores appeared to mediate the association between ACEs and perceived stress (b = .99, p < .001), as well as that of ACEs and depression (b = 1.61, p < .001). Neither of the other two COVID-19 stressors measured were significant to either measured mental health outcome. The results from this study indicate that mothers who experienced childhood adversity may be especially vulnerable to the effects of the COVID-19 pandemic on mental health, particularly as they relate to feelings of isolation and lack of social support.

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CHAPTER I

INTRODUCTION

Since the onset of the COVID-19 pandemic, more than half a million people have died due to the novel virus in the United States alone (Johns Hopkins University, 2021). In 2020, emergency responses at federal, state, and local levels impacted Americans in unprecedented ways by restricting people's ability to work, obtain an education, and socialize (Schuchat et al., 2020). While such mandates limited the exposure and slowed infection rates (Medline et al., 2020), they also had adverse effects on people's physical and mental health, many of which are still being observed over a year later (American Psychological Association, 2021).

The psychological impact of social distancing and quarantining is also considerable; social isolation stemming from the pandemic has been associated with feelings of anger, stress, and loneliness, as well as increased suicidal ideation and substance use (Galea et al., 2020; Serafini, 2020; Shreffler et al., 2021). While people of all ages and statuses were affected by the consequences of public health efforts to slow the pandemic, mothers of young children have been uniquely affected for a number of reasons. Articles published by popular news outlets such as *The Atlantic* and *The New York Times* have attributed the increased burden on mothers to existing gender disparities

in the workplace and at home, which have only been exacerbated by schools and childcare centers closing (Grose, 2021; Lewis, 2020).

Women have borne the brunt of the pandemic's economic and social consequences (United Nations, 2020), which may have particularly adverse consequences for women with young children in the home. Maternal mental health is a significant factor for healthy child development in numerous domains (Levy et al., 2019; Phua et al., 2020). Maternal depression in particular has been shown to have detrimental effects on child development, including increased behavioral issues and psychological disorders (Goodman et al., 2011), effects which may last into adolescence and adulthood (Gilliam et al., 2015; Morgan et al., 2014).

Women who have a history of childhood adversity may be especially at risk of having mental health conditions in adulthood (Li et al., 2017). For example, Hammen and colleagues (2000) showed that young women (mean age = 18.29 years) who had experienced childhood adversity were more prone to depressive episodes when exposed to life stressors than women who had not reported such adversity in childhood. More recent research has shown that women who experienced greater abuse and neglect – and consequently, more severe symptomatology (i.e., anxiety and depression) – actually present with greater biological sensitivity to stress (e.g., HPA axis, immune markers, cortisol levels) (Menke et al., 2018).

These women in particular may be at greater risk for experiencing adverse effects of the COVID-19 pandemic. Using the stress sensitization hypothesis, which assumes that early life trauma increases sensitivity to later stressors (Stroud, 2018), this study aims to measure whether women with higher levels of childhood adversity have experienced a

greater increase in depression and perceived stress due to the pandemic. The sample for this study comes from a longitudinal study that examined the effects of ACEs on pregnancy and birth outcomes. Women (N = 177) were recruited in 2017 and 2018 from two urban prenatal clinics in Tulsa, Oklahoma at their first prenatal visit and participated in up to nine waves of data collection, primarily through online assessments. The majority of study participants (~90%) were enrolled in Medicaid at the time of recruitment, which indicates that many of them were living near or below the poverty level (Centers for Medicare & Medicaid Services, n.d.). Although the study was originally planned to end after Assessment 7, the COVID-19 pandemic offered an unprecedented opportunity to examine maternal well-being in a sample of mothers of young children during the pandemic. This offered the unique opportunity to examine data from an assessment taken by mothers right after the onset of the pandemic (Assessment 8; May 2020) and to explore associations between ACEs, pandemic-related stressors, and maternal perceived stress and depression at the beginning of the COVID-19 pandemic.

The results of this study provide important information about the experience of the COVID-19 pandemic for the well-being of mothers of young children, particularly those mothers who may be more vulnerable to the stressors of the pandemic due to past childhood adversity and socioeconomic barriers. Understanding the effects of the pandemic on these mothers' mental health will help policymakers, practitioners, and researchers in their efforts to curtail the adverse effects of the pandemic on families.

CHAPTER II

REVIEW OF LITERATURE

Theoretical Model

The Stress Sensitization Model suggests that exposure to stress and trauma, particularly early in life, increases an individual's sensitivity to subsequent stress (Stroud, 2018). An early version of this model is the diathesis-stress model, which is more broad in scope and has been largely studied in regard to psychopathology – specifically, schizophrenia (Walker & Diforio, 1997). This model aimed to explain the origins of psychological disorders and episodes by identifying vulnerabilities in the individual (Zubin & Spring, 1977). Similarly, the Stress Sensitization Model provides a framework for studying the etiology of stress by proposing that exposure to early life stress increases an individual's vulnerability to the adverse effects of physical and psychological stress later in life. More specifically, the Stress Sensitization Model highlights the importance of adverse childhood experiences (ACEs) in the pathogenesis of mental health issues later in life. While the process by which stress sensitization occurs is complex and not entirely understood, research from multiple fields of study has shown that there are both biological and psychological mechanisms involved in stress sensitization.

For example, McLaughlin and colleagues (2010) showed that individuals who had experienced childhood adversity (3 or more ACEs) were almost twice as likely to experience depression following major stress than those who reported no ACEs. Miller and colleagues (2011) suggest that childhood adversity increases vulnerability to stress through heightened inflammatory responses, resulting in higher risk for disease. Indeed, more recent research supports the idea that the brain itself may adapt to stress, becoming more sensitized in response to childhood adversity (Menke et al., 2018; Weissman et al., 2020). This idea is supported by prior research which found that childhood adversity was associated with increased inflammation and depression, a finding the researchers suggested occurs through amplified signaling in the neurological and immune systems (Miller & Cole, 2012).

Research has also shown loneliness to be associated with heightened immune responses. In two studies observing different populations of adults (e.g., healthy adults and post-treatment breast-cancer patients), both groups showed that greater loneliness was associated with higher immune responses following exposure to acute stress, suggesting a proinflammatory effect of loneliness (Jeremka et al., 2013). Results from another study showed that an intervention involving mindfulness exercises reduced feelings of loneliness in the experiment group, with over 100 observed genetic differences between the experiment and control group (Creswell et al., 2012). In addition to increasing an individual's immune response to stress, researchers suggest that exposure to childhood adversity also influences behaviors that may hinder relationships – e.g., through heightened mistrust, lack of self-regulation, and propensity to engage in unhealthy coping behaviors (Miller et al., 2011). It is possible that the link between

childhood adversity, these behaviors, and an increased likelihood for loneliness reveals a mechanism by which stress sensitization contributes to mental health issues such as depression.

In addition to research examining mechanisms of stress sensitization at an individual level (e.g., heightened inflammation and immune response), the effects of stress sensitization have also been documented in regard to more widespread crises, such as natural disasters. Research examining variation in mental health outcomes following a community-wide disaster (i.e., airline crash) showed that people who had experienced earlier trauma were consequently more susceptible to the deleterious effects of stress (e.g., distress, sleep disturbances, etc.) over a year after the crash (Dougall et al., 2000). Early life adversity, in combination with other individual risks (e.g., socioeconomic disparities, racial/ethnic discrimination) (Cutter & Finch, 2008), therefore might put certain groups of people at a higher risk for experiencing adverse mental health effects of traumatic events such as natural disasters, or in the case of the present study, a global pandemic.

Adverse Childhood Experiences (ACEs) and Maternal Mental Health

The seminal Adverse Childhood Experiences (ACE) study showed that adults who had experienced childhood adversity were empirically much more susceptible to health risks in adulthood, including psychological disorders as well as physical diseases like cancer and heart disease (Felitti et al., 1998). The ACEs questionnaire included 10 types of adversity or household dysfunction, all of which had to have occurred before the age of 18 years. These included: physical abuse, emotional or verbal abuse, sexual abuse, physical neglect, emotional neglect, parental divorce, substance abuse in the household,

incarceration of a household member, exposure to domestic violence, and mental illness or suicide of a household member. The results from the ACE study showed that there was a dose-response relationship between number of ACEs and health risks, such that the more types of ACEs a person reported, the more likely they were to experience various morbidities (Felitti et al., 1998).

Over the past 20 years, numerous studies have replicated the findings from the ACE study and helped to explain the mechanisms by which childhood adversity has such effects. One explanation is that adaptations in the brain may be largely responsible for the biopsychological effects of early life adversity (McEwen, 2007). For example, Yu and colleagues found that neural networks observed in patients with Major Depressive Disorder (MDD) were significantly associated with histories of childhood adversity (2019). Indeed, multidisciplinary research supports the idea that adversity in childhood can interrupt development of multiple systems in the body, potentially having lifelong effects on physical and mental wellbeing (Shonkoff et al., 2012).

Another mechanism by which ACEs may adversely affect individuals later in life is through risky behaviors, including sexual activity, drug use, and self-harm. A study published in 2003 showed that adults with ACEs have much higher odds of substance use and abuse, with the likelihood of drug problems and addiction increasing with every additional reported type of ACE (Dube et al.). More recently, a study by Campbell and colleagues (2016) demonstrated a significant association between certain kinds of ACEs (e.g., sexual abuse, incarceration of a household member) and an increased likelihood for engaging in risky sexual behaviors. These high-risk behaviors are often coping mechanisms that reflect poor mental health (Anda et al., 2006).

Childhood Adversity and Perceived Stress

Stressors are typically salient predictors of mental health. While there are inarguably life events that are more or less stressful than others, the perception of stress may be a better predictor of the effects that stress may have on an individual. Of course, an individual's perception of stress likely depends on their previous experiences. One example of this is seen in results from a study which indicated that the number of ACEs an individual reported were significantly associated with the number and severity of their current self-reported stressors (Mosely-Johnson et al., 2021). When researching stress, it is important to differentiate between the presence of objective stressors and the more subjective experience of stress.

The Perceived Stress Scale (PSS; Cohen et al., 1983) was developed as a measure of the experience of stress and has been shown to contribute to a myriad of physical and mental health conditions (Cohen et al., 1983; Hewitt et al., 1992). Childhood adversity has been previously linked to perceived stress in adulthood; McLaughlin and colleagues (2010), for example, found that men and women who reported more childhood adversity had higher scores of perceived stress, regardless of the actual number of life stressors reported, in addition to higher levels of depression and anxiety. Perceived stress may be particularly salient for maternal mental health. For instance, in one review assessing maternal health, researchers found strong evidence of the connection between perceived stress and maternal depression (Razurel et al., 2013).

Childhood Adversity and Maternal Depression

Maternal depression is an issue of concern globally for policymakers and practitioners (Atif et al., 2015). While rates of depression are higher for women in low-

income countries (Woody et al., 2017), research suggests that depression affects 5-10% of mothers of children of all ages in industrialized nations (Letourneau et al., 2013). In the United States, one in ten of mothers experience depression at any given time, a statistic which is troubling, considering how maternal depression can disrupt women's lives (e.g., affecting ability to work, contributing to financial issues, and more) (Ertel et al., 2011).

Aside from being debilitating for women, maternal depression may also have serious implications for child development. A recent review, for example, found that maternal depression was associated with increased internalizing and externalizing behaviors in children as well as general psychopathology (Goodman et al., 2011). In addition to affecting wellbeing in childhood, the effects of maternal depression on children may even carry into adolescence and adulthood. For instance, Gilliam and colleagues (2015) found that maternal depression was associated with increased aggression of children in adulthood. Another study found that maternal depression was related to children's neural reward processing at 20 years old (Morgan et al., 2014).

While there are many factors that influence maternal mental health, childhood adversity has been shown to be significantly associated with an increased risk of maternal depression (Li et al., 2017). Women who have been exposed to adversity during childhood have been shown to be more vulnerable to the effects of stress, which include increased depression and anxiety (Hammen et al., 2000). A recent meta-analysis found that while maternal ACEs are significantly associated with depression in both the pre- and post-natal periods, the association strengthened as the post-partum period progressed (Racine et al., 2021). This finding suggests that life stressors associated with raising

children may be an important factor for maternal mental health, particularly among mothers whose childhoods involved adversity.

The COVID-19 Pandemic as a Stressor

Initially identified in late 2019, the novel coronavirus commonly referred to as COVID-19 rapidly became the source of an ongoing global pandemic (Fauci et al., 2020). While the fatality rate of the virus is less than 1% of those affected (Fauci et al., 2020), its high transmissibility and complex, multi-systemic effects were cause for massive, immediate global prevention and intervention efforts (Velavan & Meyer, 2020). By the end of March 2020, most of the United States had implemented restrictions on travel and healthcare, as well as issued stay-at-home orders for non-essential personnel (Schuchat et al., 2020). This meant that a large proportion of families and individuals became isolated for a substantial period of time from work, school, and social gatherings.

Social and Psychological Consequences of the COVID-19 Pandemic

Not surprisingly, social distancing and quarantine measures have had negative consequences on Americans – including worsened mental health and increased substance use (Czeisler et al., 2020). One study involving older adults (mean age = 75 years) showed increased loneliness and depression following stay-at-home orders (Krendl & Perry, 2020). Marroquin and colleagues (2020) presented similar findings in a sample of American adults (mean age = 40 years), who exhibited increased depression, anxiety, and stress in response to stay-at-home orders and personal social distancing behaviors. Among a sample of mothers in Canada with children 8 years old or younger, researchers found dramatically increased incidences of depression and anxiety following the onset of the COVID-19 pandemic and stay-at-home orders, which they suggest may be attributed

to stressors such as finances and marital issues (Cameron et al., 2020). Cameron and colleagues (2020) also found that previous mental health issues were significantly associated with depression and anxiety following the pandemic, which they suggest may be an effect of increased vulnerability to stress (i.e., stress sensitization).

Loneliness is also one explanation for the adverse psychological consequences of the COVID-19 pandemic (Shreffler et al., 2021). The connection between loneliness and adverse mental health symptoms has been long established (Ditommaso & Spinner, 1997). Loneliness has been described in the literature as a subjective experience that causes poor psychological health; this experience is in some way related to relational deficit that may or may not be representative of actual isolation (Marangoni & Ickes, 1989; Peplau & Perlman, 1982). It is possible that self-reported loneliness may be particularly high due to physical isolation and the absence of social interaction due to the COVID-19 pandemic.

Economic Consequences of the COVID-19 Pandemic

The COVID-19 pandemic affected the global economy in unprecedented ways. Social distancing measures resulted in job losses and highly decreased demand in various sectors (Nicola et al., 2020). In a recent report from the Pew Research Center, data shows that over 40% of American adults report that they or someone in their household lost employment since the start of the pandemic (Menasce Horowitz et al., 2021). While Americans of all income levels were financially affected by the pandemic, minority and low-income individuals were hit the hardest, expressing concerns about financial goals like saving and retirement (Menasce Horowitz et al., 2021).

Health Fears Associated with COVID-19

In addition to the concerns about finances, many Americans' work-lives were also altered due to health concerns associated with COVID-19 (Centers for Disease Control and Prevention, 2021). Indeed, the heightened awareness and overall fear regarding disease transmission that COVID-19 created has been detrimental in several ways. One early study (March 2020) showed that fear regarding COVID-19 was significantly associated with increased depression scores among Americans (Fitzpatrick et al., 2020). The same study reported that increased depression in response to COVID-19 was greater and more significant for socially vulnerable individuals, including those with minority status, those who were unemployed, and those who were food-insecure (Fitzpatrick et al., 2020). Similarly, another study reported that health fears about COVID-19 were significantly associated with increased depression among adults living in South Africa (Kim et al., 2020), but in this study, the effect was moderated by childhood adversity, and although the interaction was not quite significant ($p = .063$), this relationship warrants further investigation.

Research Question and Hypotheses

The current study examines the potential association(s) between childhood adversity (i.e., ACEs), stressors related to the COVID-19 pandemic, and mental health issues (e.g., perceived stress and depression) among a low-income sample of mothers to young children. Through quantitative analyses, this study tests the following hypotheses:

H1: Adverse Childhood Experiences (ACEs) are a significant predictor of perceived stress among mothers of young children during the COVID-19 pandemic.

H2: Adverse Childhood Experiences (ACEs) are a significant predictor of depression scores among mothers of young children during the COVID-19 pandemic.

H3: COVID-19-related stressors, including loneliness, economic concerns, and health fears, mediate the relationship between ACEs and mental health outcomes among mothers of young children (e.g., perceived stress and depression).

CHAPTER III

METHODOLOGY

Sample

The sample for this study comes from a longitudinal research project based in Tulsa, Oklahoma, which initially intended to examine the effects of childhood adversity on pregnancy health and birth outcomes. Participants were recruited during pregnancy at two metro-area perinatal clinics in 2017 and 2018. Since the time of recruitment, they have participated in up to nine waves of online data collection. This study analyzes demographic and historical data (i.e., ACE scores) collected from Assessment 1 as well as data from Assessment 8, which surveyed mental health and household circumstances following the onset of the COVID-19 pandemic (May 2020). The sample for this study was limited to those who participated in the included assessments (N = 113). In terms of sociodemographic characteristics, the sample is fairly diverse: 40% non-Hispanic White, 28% Black, 14% Hispanic, and 18% Native American. The mean age of participants is 25 years old, and the average highest level of education completed is a high-school degree (M = 13.05 years) .

Community Context

The COVID-19 pandemic has affected people in different ways, depending on their geographic location and household circumstances. It is especially important, therefore, to consider context when exploring the more micro-level effects of a widespread crisis.

While the sample is not representative of the general population, it is comprised of a particularly vulnerable group: mothers who may be at higher risk for health issues (and whose children may be at higher risk) due to barriers associated with socioeconomic factors, marital status, and racial/ethnic minority status (Crosier et al., 2007). Women of minority status, lower socioeconomic status, and those that work in the service industry – which comprise the majority of this sample – may be especially vulnerable to the risks associated with COVID-19 and the economic effects of the pandemic (Norwood, 2020). Exploring maternal mental health issues within higher-risk communities is important for many reasons. Maternal health is a predominant contributor to infant and child morbidity and mortality, which is seen especially in communities where healthcare is less accessible due to socioeconomic barriers (Burns, 2005). Oklahoma is one of those places – despite strides in healthcare provision and education, it currently ranks among the bottom five states for maternal and child health indicators (United Health Foundation, 2021).

Although the present sample is largely low-income and minority-status, there is also notable variation regarding effects of the pandemic due to the nature of Oklahoma landscape. Oklahoma was slower to experience the spread of COVID-19 and did no report peak infection rates until later in the summer (*American Journal of Managed Care*, 2021). Still, the economic impacts of the lockdowns were considerable; in April 2020,

unemployment rates increased by almost 10% and many industries have still not recovered over a year later (U.S. Bureau of Labor, 2021). Additionally, the pandemic created added burdens for parents; the Tulsa Public School district only offered virtual learning between mid-March 2020 and mid-March 2021 (Fox23, 2021).

Another important contextual factor to note is Tulsa's history of racial discrimination. In any heterogeneous population, there are typically observable racial and ethnic disparities, but Tulsa has a particularly problematic history of racial discrimination – a history that has only recently been acknowledged (Ellsworth, 1992; Li, 2021). Northeast Oklahoma is also home to several tribal reservations and a high proportion of Native American individuals (Healy & Liptak, 2020). These details underscore ongoing health disparities which have seriously harmful implications for communities in Tulsa and surrounding regions (Tulsa Health Department, 2015). Highlighting the local context in which the data collection occurred is important for contextualizing the findings and their potential implications for similar populations.

Measures

Assessment 1, conducted while participants were pregnant, included the childhood adversity and sociodemographic control measures included in this study. Assessment 8 was conducted in April-May 2020 and included questions about pandemic-specific stressors and mental health.

Dependent Variables

***Perceived Stress*.** The Perceived Stress Scale (PSS; Cohen, 1983), which measures the perception of stress as opposed to the presence of objective stressors, was asked in Assessment 8. The PSS is a 10-item scale that asks participants how often they

experienced feelings in the past month, including questions such as, “felt nervous and stressed?” “felt confident in your ability to handle personal problems?” and “felt difficulties were piling up so high that you could not overcome them?” Responses were coded and reverse coded and summed so that higher scores indicate higher perceived stress.

Depressive Symptoms. The Center for Epidemiological Studies – Depression (CES-D) scale (Radloff, 1977) was used to assess depressive symptomology in Assessment 8. Participants were asked how they were feeling about life these days, including questions such as, “I was bothered by things that do not usually bother me;” “I felt like everything I did was an effort;” and “I could not get going.” Survey responses to the 20 CES-D questions were coded and recoded such that higher scores indicated higher levels of depression.

Independent Variable

Adverse Childhood Experiences. In Assessment 1, participants took the ACEs survey (Felitti et al., 1998) by reporting which, if any, of the 10 types of ACEs they had experienced prior to age 18. Adding the responses created a 0-10 scale in which the score indicates number of adverse childhood experiences, such as emotional and physical abuse, sexual abuse, neglect, and household dysfunction.

COVID-19 Stressors as Potential Mediating Factors for Increased Mental Health Issues

Loneliness. The ULS-8 is an 8-item scale (Hays & DiMatteoa, 1987) adapted from the original 20-item UCLA Loneliness Scale, both of which assess actual social isolation as well as feelings of loneliness (Russell et al., 1978). Participants were asked

the extent to which they had been feeling lonely, including questions such as, “I lack companionship;” “I am no longer close to anyone;” and “No one really knows me well.” Items were coded and recoded and summed so that higher scores indicated higher loneliness.

Economic insecurity. In Assessment 8, participants were asked whether there had been changes in employment in the household. Participants were also asked whether they or someone in their household had experienced a job loss or decrease of work hours in response to the COVID-19 pandemic. These questions were used to create a household-level measure loss of employment or work hours (1 = job loss/reduced hours; 0 = no job loss/reduction in hours).

Health concerns. In Assessment 8, participants were asked how concerned they were about themselves, a member of the household, or a close friend or family member contracting COVID-19. Answer ranged from *Not at all concerned* to *Extremely concerned* and were coded on scale of 0 to 10, with zero indicating no concern.

Sociodemographic Control Variables

Several sociodemographic questions were coded as control variables. Age was included as a continuous variable ranging from 16 to 36 years. Race/ethnicity was coded into dummy variables as *White, Black, Hispanic,* or *Native American,* with *White* as the reference category. Marital/cohabitation status was coded as “0” for those who identified as single and “1” for those who were married or in a cohabiting union. Additionally, education level was coded in years completed (e.g., “12” for high-school diploma or equivalent), as a marker of socioeconomic status.

Analyses

Analyses were conducted using IBM SPSS Version 27. Data was analyzed for all participants who completed Assessment 8 (N = 113). However, those with missing data for relevant measures were excluded from the regression analyses using listwise deletion. Descriptive statistics of study variables first conducted, followed by a bivariate correlation analysis. Multiple linear regression analysis was used to examine the associations between adverse childhood experiences, COVID-19 stressors, and maternal mental health.

CHAPTER IV

FINDINGS

Descriptive Statistics

Table 1 shows the descriptive statistics for sociodemographic characteristics and variables assessed in the present study (N = 113). The mean CES-D score reported in Assessment 8 was 16.6 (SD = 10.72). A score of 16 or higher on the CES-D may indicate clinical significance for depression diagnoses in some individuals (Zich et al., 1990). The mean score for perceived stress was just over the midpoint at 16.13 (SD = 6.97), which is comparable to average scores seen in similar populations (e.g., lower-income women in the United States) but slightly higher than those of men and individuals with higher education and income levels (Cohen & Janicki-Deverts, 2012). The prevalence of childhood adversity among the current sample is also higher than in the general population. Participants reported an average of 3.04 ACEs (SD = 2.92), almost twice the national average (Giano et al., 2020). The mean loneliness score was 15.94 (SD = 5.47). Almost half of participants reported a reduction in job hours or job loss in the household following COVID-19 restrictions (M = .48; SD = .50). Additionally, the mean score for COVID-19-related health concerns, which was measured on a scale of 1-10, was 5.44 with a standard deviation of 2.65. On average, participants were 25.77 years old (SD =

5.54) and had completed 13.05 years of education (*SD* = 2.00), or one year of college. Almost 60% of participants were living with a partner (married or cohabiting) at the time of recruitment (*M* = .58, *SD* = .50). Almost half of the sample reported being White (48%), 34% Black, 14% Hispanic, and 19% Native American. The sum of percentages reported equal more than 100 due to participants having the option to report multiple ethnicities.

Table 1: *Descriptive Statistic*s (*N* = 113)	*M*	*SD*	Range
ACEs	3.04	2.92	0-10
Depression (CES-D score)	16.60	10.72	1-50
Perceived stress	16.13	6.97	0-31
Loneliness	15.94	5.47	8-29
Economic insecurity[a] (0 = no, 1 = yes)	.48	.50	0-1
Health concern (scale of 1-10)	5.44	2.65	2-10
Age (in years)	25.77	5.54	16-38
Highest level of education completed (in years)	13.05	2.00	8-19
Union status (0 = no, 1 = married or cohabiting)	.58	.50	0-1
White	.48	.50	0-1
Black	.34	.47	0-1
Hispanic	.14	.35	0-1
Native American	.19	.40	0-1

a = Indicates loss of employment or reduction in work hours in the household

Correlation

Correlation analyses were conducted to measure bivariate associations between the study variables (Table 2; p. 23). Significant associations were found between ACEs and loneliness (r = .48, p < .01) as well as with each of the mental health outcomes measured (e.g., perceived stress and depression; r = .25 and .29, p < .01, respectively). Significant correlations were also found between the two dependent variables (DVs), perceived stress and depression (r = .78, p < .01), and between both DVs and loneliness scores (r = .69 and .73, p < .05, respectively). The high Pearson coefficients could be attributed to overlapping constructs measured in each of the scales. Regarding pandemic-related variables, health concerns were significantly associated with loneliness (r = .37, p < .01). Health concerns were also negatively associated with union status (i.e., being married or cohabiting; r = -.21, p < .05) and the racial category White (r = -.19, p < .05). Several demographic variables were also correlated, including education and age (r = .3, p < .01) and race/ethnicity. ACEs were associated with two of the racial categories – positively with White (r = .19, p < .05) and negatively with Black (r = -.24, p < .01).

Perceived Stress

Results from the regression analyses using PSS scores as the dependent variable can be seen in Table 3. After controlling for demographic variables (e.g., age, education, and race/ethnicity; Model 1), regression analyses showed childhood adversity (i.e., ACEs) to be a significant predictor of perceived stress following the onset of the COVID-19 pandemic (b = .48, p < .05; Model 2). However, the third regression model, which included pandemic-related stressors (e.g., economic insecurity, health issues, and

loneliness) showed loneliness to be significant (b = .99, p < .001) while ACEs was no longer significant and the association reversed, indicating a suppression effect.

Table 3: *Linear Regression Analysis of PSS (Perceived Stress) Scores by Sociodemographic Variables, ACE Score, and COVID-19 Factors* (N = 92)

	Model 1			Model 2			Model 3		
Variables	*b*	*SE*	Sig.	*b*	*SE*	Sig.	*b*	*SE*	Sig.
Age	-0.11	0.14		-0.11	0.14		-0.04	0.10	
Education	-0.43	0.39		-0.40	0.38		-0.42	0.27	
Union	-0.96	1.62		-0.97	1.59		0.62	1.20	
White (ref)									
Black	-1.80	1.84		-1.15	1.84		-2.33	1.33	
Hispanic	-2.94	2.12		-2.59	2.09		-1.87	1.51	
Native	3.00	1.86		2.82	1.83		-0.01	1.35	
ACEs				0.48	0.24	*	-0.36	0.20	
Economic insecurity							1.29	1.03	
Health concern							-0.22	0.22	
Loneliness							0.99	0.12	***
Constant	25.59	6.1	***	23.4	6.1	***	9.13	4.74	

Note. White is used as a reference category for other ethnicities listed
***p < .001, **p < .01, *p < .05

Depression

Results from the regression analyses using CES-D scores (i.e., depression) as the dependent variable can be seen in Table 4. Controlling for demographic variables (Model 1), results showed that number of ACEs was a significant predictor of depression during the COVID-19 pandemic (b = 0.88, p < .05; Model 2). Similar to regression models involving Perceived Stress, ACEs was no longer a statistically significant predictor of depression when COVID-19-related stressors were added to the model (Model 3), and the only COVID-19 variable significant to the model was loneliness (b = 0.18, p < .001). In the fourth and final model, loneliness and perceived stress both appeared to be highly

significant predictors of depression (b = 0.21, p < .001; b = 0.76, p < .001), while ACEs was not significant.

Table 4: *Linear Regression Analysis of CES-D (Depression) Scores by Sociodemographic Variables, ACE Score, COVID-19 Factors, and Perceived Stress* (N = 91)

	Model 1			Model 2			Model 3			Model 4		
Variables	*b*	*SE*	Sig.	*b*	*SE*	Sig.	*b*	*SE*	Sig.	*b*	*SE*	Sig.
Age	0.06	0.22		0.06	0.22		0.18	0.15		0.21	0.13	
Education	-0.71	0.60		-0.65	0.59		-0.72	0.41		-0.39	0.36	
Union Status	-2.74	2.54		-2.79	2.48		-0.31	1.82		-0.79	1.58	
White (Ref)												
Black	-1.70	2.89		-0.50	2.87		-2.50	2.01		-0.69	1.78	
Hispanic	-4.91	3.33		-4.24	3.26		-3.07	2.27		-1.65	1.99	
Native	4.76	2.93		4.49	2.86		-0.14	2.05		-0.09	1.78	
ACEs				0.88	0.38	*	-0.52	0.30	+	-0.23	0.27	
Economic insecurity							1.03	1.57		0.09	1.37	
Health concerns							-0.36	0.34		-0.18	0.30	
Loneliness							1.61	0.18	***	0.85	0.21	***
Perceived stress										0.76	0.15	***
Constant	27.00	9.57	**	23.02	9.50	*	0.58	7.15		-6.36	6.36	

***p<.001, **p<.01, *p<.05, + p<.10, nearing significance

Table 2*: Correlation Matrix of All Variables* (*N* =113)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	1												
2. Education	.30**	1											
3. Union status	-.09	-.05	1										
4. White	.08	.01	.27**	1									
5. Black	.03	.02	-.39**	-.46**	1								
6. Hispanic	-	-.13	.03	-.29**	-.29**	1							
7. Native	-.04	-.25*	.10	-.20*	-.11	-.01	1						
8. ACES	.01	-.05	.08	.19*	-.24**	-.01	.02	1					
9. Economic insecurity	.04	-.03	-.16	-.17	.03	.02	.02	-.02	1				
10. Health concerns	.08	-.02	-.21*	-.19*	.04	.03	.002	.10	.04	1			
11. Loneliness	-.003	-.07	-.09	-.09	-.04	-.05	.18	.48**	.12	.37**	1		
12. Perceived stress	-.05	-.18	-.02	.04	-.12	-.07	.17	.25**	.14	.19*	.70**	1	
13. Depression	.01	-.17	-.08	-.01	-.05	-.11	.15	.29**	.13	.21*	.74**	.78**	1

**$p <$ .01; *$p <$ .05

CHAPTER V

CONCLUSION

Discussion

The purpose of the current study was to explore the effects of the COVID-19 pandemic on mothers of young children, and more specifically, how maternal childhood adversity may affect mental health responses to subsequent stressors. According to the Stress Sensitization Hypothesis, exposure to stress and adversity earlier in life increases an individual's sensitivity to stressors later in life, potentially exacerbating mental health issues following exposure. Using this framework, I hypothesized that ACEs would significantly predict increased perceived stress and depression measured shortly after the onset of the COVID-19 pandemic, and that stressors related to the pandemic (e.g., economic insecurity, health concerns, loneliness) would mediate this association. Participants reported relatively high levels of childhood adversity (i.e., ACEs), which have been repeatedly shown to be associated with mental health issues (Hammen et al., 2000; Li et al., 2017). As hypothesized, regression analyses showed that ACEs were significantly associated with mental health outcomes measured – both perceived stress and depression scores – following the onset of the COVID-19 pandemic. The impact of

maternal ACEs on mental health observed in this study is consistent with findings from earlier research (McLaughlin et al., 2010; Racine et al., 2021).

Descriptive statistics showed that around half of participants reported some type of pandemic-related disruption in the household (e.g., job loss, health concerns). For example, 48% of participants reported loss of employment or a reduction in work hours in their household. However, despite the prevalence of reported stressors associated with the COVID-19 pandemic, there was little support for the hypothesis that pandemic-related stressors predict greater depression and perceived stress. Neither health fears regarding COVID-19 nor economic insecurity were significantly associated with mental health outcomes, which is contrary to existing literature (Fitzpatrick et al., 2020; Kim et al., 2020). However, this could be due in part to timing. Assessment 8, which measured pandemic stressors, was administered in April-May of 2020, but Oklahoma did not experience peak infection rates until later in the summer (*American Journal of Managed Care*, 2021). It is possible that health fears were not as prevalent early in the pandemic for this reason. It is also possible that the small sample size precluded significance of associations with lower magnitude.

Only one of the three measured stressors, loneliness, was found to be significantly associated with both mental health outcomes assessed in this study – perceived stress and depression. Additionally, loneliness appeared to mediate the association of ACEs with perceived stress and depression, as ACEs was no longer significant and the coefficient sign reversed when loneliness scores were added to the models. This finding is consistent with previous research into the effect of loneliness on COVID-19 distress (Shreffler et al., 2021). Additionally, this finding provides support for the Stress Sensitization Model

in that loneliness at the beginning of the pandemic was more prevalent among participants with higher childhood adversity and more highly associated with other mental health outcomes measured. These findings may be the result of less stable relationships and greater mistrust among individuals with higher levels of ACEs (Miller et al., 2011), but effects of the pandemic such as financial strain and marital conflict (Cameron et al., 2020) may also have exacerbated existing feelings of loneliness and lack of support. It is impossible to know whether the association in this study was specifically a result of the pandemic, as loneliness has long been linked to various mental health issues (Ditommaso & Spinner, 1997).

Finally, perceived stress also appeared to be a significant predictor of depression, which is consistent with extant literature (Hewitt et al., 1992; Razurel et al., 2013). In previous research, social support – or lack thereof – has been shown to mediate the relationship between perceived stress and depression (Choenarom et al., 2005; Ling-ling et al., 2008; Zhang et al., 2014). It is possible that loneliness had a similar effect in this group of mothers, contributing to perceived stress and subsequent depressive symptoms.

Strengths & Limitations

Overall, the results from this study suggest that childhood adversity (i.e., ACEs) predicts depressive symptoms and feelings of stress following large-scale crises such as COVID-19, as suggested by the stress sensitization hypothesis. Further, the results indicate that loneliness is a mediator of these associations, and that perceived stress also uniquely contributes to feelings of depression among mothers of young children. While there were no significant associations found between the other pandemic-related stressors (e.g., economic insecurity and health concerns), this may be due in part to small sample

size or to the timing of the assessment, as aforementioned. Additionally, the brief nature of the pandemic-specific questions (e.g, one-item questions regarding economic insecurity and health concerns) may also have limited their capacity to fully measure the stress these circumstances effected. Lastly, the nature of the COVID-19 pandemic and emergency responses is highly contextual, and it would be erroneous to assume that all participants' experiences were the same. Various contextual factors, such as type of employment or city-level mandates, undoubtedly affected participants' lives. It is not feasible to account for all relevant variables that may contribute to mental health.

Still, the findings from this study offer novel insight into the ways in which the COVID-19 pandemic has affected: (a) individuals with a history of childhood adversity and (b) mothers of young children, particularly those of lower SES. The findings from this study are a great example of the less direct – and less predictable – ways in which childhood adversity may affect individuals later in life.

Future Directions

Further research is needed into the long-term effects of the pandemic on mental health, especially as many social-distancing regulations have been lifted following widespread vaccination efforts (CDC, 2021). Longitudinal research and qualitative analyses will provide a more comprehensive explanation for the multi-layered effects of the pandemic on mental health and family functioning.

While this study highlights potential risk factors for mental health issues in the context of COVID-19, there is also a need to identify characteristics and behaviors that promote resilience for mothers of young children. Future research would ideally include resilience factors such as Protective and Compensatory Experiences (PACEs), which

have been shown to buffer the effects of childhood adversity (Hays-Grudo & Morris, 2020). Identifying factors that help protect individuals from the impacts of stress could help prevent the intergenerational transmission of trauma that may result from the effects of the pandemic (Yehuda & Lerner, 2018).

In light of the findings that loneliness was a significant contributor to measured mental health outcomes, health providers and mental health clinicians may help young mothers by emphasizing the importance of social support, particularly among women who may have experienced trauma in the past and may not have the typical family support. Community organizations and other invested parties should explore ways to connect women in safe ways, while taking into account limitations associated with such socioeconomic barriers as limited transportation and non-traditional work schedules (e.g., Morris et al., 2017).

Conclusion

The present study replicated results from earlier studies as well as contributed novel findings to the field of social science, particularly related to adversity, maternal mental health, and effects of the COVID-19 pandemic. In this study, maternal childhood adversity was found to be significantly associated with perceived stress and depression following the onset of the COVID-19 pandemic. Loneliness was identified as a potential mediator for these associations, as was perceived stress with depression. It is possible that individuals who experienced childhood adversity are more prone to loneliness due to lack of social support or complex familial relationships. While loneliness has long been associated with poor mental health, few studies have highlighted this relationship in the context of childhood adversity, and only one study, to my knowledge, has done so in the

context of the COVID-19 pandemic. While other pandemic-related stressors (e.g., health concerns and economic insecurity) were not found to be significant predictors of perceived stress or depression, this may be due to having a smaller sample size or the delayed effects of the pandemic in the Central U.S. Future research should examine these factors using a broader timeline or longitudinal data. Despite these limitations, the strengths of the study, which included a sample of diverse, disadvantaged mothers of young children recruited before the pandemic and longitudinal data collection, provide insights into the critical role that early life adversity had on maternal mental health and suggest that targeting the reduction of loneliness may help to improve maternal mental health—especially among those more vulnerable due to a history of childhood adversity.

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APPENDICES

Oklahoma State University Institutional Review Board

Date:	02/23/2021
Application Number:	HS-18-71
Proposal Title:	Holistic Assessment of Tulsa Children's Health Enhancing Maternal-Fetal Bonding to Promote Healthy Pregnancies and Reduce Adverse Perinatal Outcomes
Principal Investigator:	Karina Shreffler
Co-Investigator(s):	
Faculty Adviser:	
Project Coordinator:	STACY TIEMEYER
Research Assistant(s):	
Processed as:	Full Board

Status Recommended by Reviewer(s): Approved

Approval Date:	**12/11/2020**
Expiration Date:	**12/10/2021**

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 223 Scott Hall (phone: 405-744-3377, irb@okstate.edu).

Sincerely,
Oklahoma State University IRB

VITA

Christine N. Joachims

Candidate for the Degree of

Master of Science

Thesis: MATERNAL CHILDHOOD ADVERSITY AND THE EFFECT OF COVID-19 ON MENTAL HEALTH OUTCOMES

Major Field: Human Development and Family Science

Biographical:

Education:

Completed the requirements for the Master of Science in Human Development and Family Science at Oklahoma State University, Stillwater, Oklahoma in July, 2021.

Completed the requirements for the Bachelor of Science in Human Development and Family Science at Oklahoma State University, Stillwater, Oklahoma in 2017.

Experience:

2019-2021: Graduate research assistant for the HATCH Project and BLOOM

2020-2021: Graduate teaching assistant for World Perspectives online (Fall 2020) and Critical Issues online (Spring 2021)

Publications:

Shreffler, K.M., Joachims, C.N., Tiemyer, S., Simmons, W.K., Teague, T.K., & Hays-Grudo, J. (2021). Childhood adversity and perceived distress from the COVID-19 pandemic. *Adversity and Resilience Science, 2*(5), 1-4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7841380/