



# Perinatal Mental Health Support and Early Childhood Home Visitation During COVID-19

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## Abstract

COVID-19 has disrupted many of the preventive service sectors designed to serve mothers at-risk for developing postpartum depression, forcing a rapid transition to telehealth-based modes of delivery. The purpose of this study was to explore differences in early childhood home visitation service provision (enrollment and depression screening) among mothers receiving home visitation services prior to and after the onset of the COVID-19 pandemic. Additional factors related to receipt of virtual home visitation services, family risk factors, and the maternal depressive symptoms were examined. Linear and logistic regression were utilized to examine whether there were differences in family risk factors, the percentage of mothers being screened for depression and maternal depressive symptoms, and associations between risk factors and positive depression screenings, while accounting for clustering by site. Samples compared outcomes for families enrolled during the pre-pandemic period (defined as March 16th to July 27th, 2019,  $n=4,743$ ) and the post-pandemic period (defined as March 16th to July 27th, 2020,  $n=2,049$ ). Families enrolled after the onset of the pandemic were significantly less likely to be impacted by housing instability, have a child with a disability, or be involved with the military, but more likely to have a history of child abuse or neglect. Fewer mothers were screened for depression during the pandemic and maternal report of depressive symptoms decreased. Virtual home visitation is currently attracting some groups of mothers who are experiencing fewer stressors, which may place them at decreased risk for exhibiting depressive symptoms. There may be aspects of the virtual depression screening experience that make detection more difficult. As a result, many mothers at risk for maternal depression may not receive adequate prevention services.

**Keywords** Home visitation · Postpartum depression · Screening · Telehealth

Prior to the COVID-19 pandemic, hundreds of thousands of mothers received early childhood home visitation services consisting of screening, case management, family support, and caregiver skills training to promote maternal and child health and mental health (National Home Visiting Resource Center, 2019). High-quality home visitation services for infants and young children show evidence of improving parent–child interactions and relationships, maternal mental health outcomes, and reducing child maltreatment (Duffee et al., 2017; U.S. Department of Health and Human Services, Administration for Children & Families, 2019). These

positive outcomes of home visitation can buffer vulnerable families against perinatal mental health risk and subsequent adverse childhood experiences (Shonkoff, 2016). Most home visitation programs are targeted to mothers of infants and young children considered “high-risk” as defined by falling into one of the following categories: (1) an income below the federal threshold; (2) under 21 years old; (3) parenting alone; (4) without a high school education. National estimates indicate that 51% of home visitation participants meet at least 1 high risk category and 21% meet 2 or more high risk criteria (National Home Visiting Resource Center, 2019).

Large-scale social distancing measures launched by states and counties to combat the transmission of COVID-19 meant home visitors could no longer visit families in their homes, leaving high-risk mothers at even greater risk for pre-natal and post-partum mental health complications, parenting difficulties, and social isolation. To avoid gaps in

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services, there was an immediate industry wide shift to “virtual home visitation,” via telehealth service delivery platforms. Given recent reports during the COVID-19 pandemic that mothers are at increased risk for mental health difficulty, home visitation services could serve as an important preventive safety net for new mothers who are now encountering unprecedented social isolation and service disruption. The purpose of this study is to explore differences in early childhood home visitation service provision (enrollment and depression screening) among mothers receiving home visitation services prior to and after the onset of the COVID-19 pandemic.

## Background

### Mental Health Strain of Mothers with Young Children

The period of early parenting is a vulnerable time period for mothers and their young children. Events associated with early motherhood, including post-partum depression, parenting stress, birth trauma, and fatigue can all contribute to declines in mental health status during this period of time, impacting parenting practices and outcomes. Mothers suffering from postpartum depression (PPD) experience significant negative affect disruption, which has been associated with impaired infant development, insecure attachment (Hayes et al., 2013), soothing difficulties (Bernard-Bonnin, 2004), negative emotionality (Teti et al., 1995), self-regulatory disturbances (Khoury et al., 2016), poorer social-competence (Kersten-Alvarez et al., 2010), and poorer cognitive development (Azak, 2012; Bernard-Bonnin, 2004). In addition, a recent meta-analysis of 193 studies found that maternal PPD significantly predicts childhood psychopathology (Goodman et al., 2011). Parental stress and burnout occurs due to a mismatch between the demands of parenting and the resources available for parents to meet those demands (Griffith, 2020). Research on parental stress and burnout has suggested that parents who experience burnout are more likely to engage in child maltreatment, placing children at risk for detrimental short- and long-term outcomes (Griffith, 2020). Additionally, women who experience birth trauma have described disconnection with their infants, lack of confidence in their parental decision making, distressing memory gaps of the immediate post-partum period, and physical recovery that overwhelmed their capabilities to parent the way they had imagined they would (Molloy et al., 2020). Chronic fatigue has been shown to increase parental irritability and angry and fatigued parents are less likely to be able to attend and engage in play (Giallo et al., 2013). Furthermore, the intersection of maternal depression and fatigue can have

deleterious impacts on parenting. Wade et al. (2012) found that while not all fatigued mothers experience depression, those who experience a comorbidity of both report higher parenting stress, lower parenting efficacy, poor satisfaction, and high parental hostility. Women who give birth prematurely, had insecure attachment styles, perceived poorer marital quality, were younger, or had fewer years of schooling have been identified as having higher risk for poor mental health the early post-partum period (Porat-Zyman et al., 2018).

### COVID-19 Impact on Maternal Mental Health

Emerging research indicates that mothers of young children are at increased risk for depression, stress, and parental burnout during the COVID-19 pandemic (Cameron et al., 2020; Cluver et al., 2020; Griffith, 2020). While there are no current reports of maternal rates of mental health difficulty in home visiting programs during the COVID-19 pandemic, reports indicate that depression and anxiety symptoms have increased for pregnant and postpartum mothers in the general population (Berthelot et al., 2020; Davenport et al., 2020). Furthermore, systematic reviews examining the impact of previous disasters (e.g., hurricanes, earthquakes, environmental/chemical disasters, and terrorist attacks) provide strong evidence for their negative effects on maternal mental health (Harville et al., 2010). The COVID-19 pandemic likely has greater implications for maternal mental health given the ubiquitous impact of the pandemic on all people. The COVID-19 pandemic introduces stressors that increase the risk for maternal mental health difficulties while simultaneously decreasing levels of social support. Social support has been shown to be a significant and consistent predictor of both mental and physical health domains in women during the perinatal period (Emmanuel et al., 2012). Necessary social distancing measures to combat COVID-19 place mothers of young children in challenging conditions of social isolation.

### Early Childhood Home Visitation to Address Maternal Mental Health

Home visitation services play an important role in the identification and amelioration of maternal mental health difficulties in families with young children. Home visitation is an evidence-based strategy in which families are engaged in their homes or communities by trained personnel (e.g., social workers, nurses, early childhood education specialists) (Duffee et al., 2017). Significant federal investment in home visitation has occurred through HRSA/ACF's Maternal, Infant, and Early Childhood Home Visitation Program (MIECHV) because these program models have improved the long-term health and well-being of mothers and children.

In 2019, hundreds of thousands of families received early childhood home visitation services consisting of screening, case management, family support, and caregiver skills training to promote positive parenting, child school readiness, good maternal and child health, mental health, and nutrition (Maternal, Infant, and Early Childhood Home Visitation Program (MIECHV), 2020). The MIECHV program has identified maternal mental health as a benchmark outcome with home visitation programs integrating depression screening into standard operating procedures and assuming responsibility for addressing positive maternal mental health screens through home visitation strategies or outside referrals. Every program that receives MIECHV funding is required to offer maternal mental health screening regardless of the home visitation model being deployed (e.g., Parents as Teachers, Healthy Families America, Nurse Family Partnership, ParentChild+, etc.) (Maternal, Infant, and Early Childhood Home Visitation Program (MIECHV), 2020). In this capacity, home visitation programs are a vital safety net for mothers at risk for maternal mental health difficulties by offering access to early detection and intervention. However, due to social distancing measures to combat COVID-19, home visitation models nationally, inclusive of various federal and state funding sources, were required to shift their mode of deliver to virtual models. With mothers now receiving their home visitation visits via interactive videoconferencing technology and telephone, it is unclear if home visitation continues to serve as a crucial safeguard for addressing maternal mental health difficulties. Given that rates of maternal depression and stress are expected to rise during COVID-19, it is vital to determine if virtual home visitation is fulfilling its charge as a frontline response to maternal mental health difficulties. The purpose of this study was to explore differences in early childhood home visitation service provision (enrollment and depression screening) among mothers receiving home visitation services prior to and after the onset of the COVID-19 pandemic. Additional factors related to receipt of virtual home visitation services, family risk factors, and the percentage of mothers meeting criteria for depression were examined.

## Methods

### Program Description

Parents as Teachers (PAT) is a national, evidence-based home visiting model that serves families through personal visits, primarily in the home (Lahti et al., 2019; Wagner et al., 2002). PAT provides early home visitation services to at-risk families prenatal to kindergarten-age. Services include early and routine health and developmental screenings of the children, mental health screening for parents, parent

social support group connections, and referrals to community resources. There are 1,200 local PAT programs implementing the model in all 50 states and six other countries. Parents as Teachers National Center (PATNC) produces the research-based curricula used by the local programs to provide uniformity of services to families in all communities and monitors the quality of services. PATNC is the training/certifying body for nearly 6,000 model-certified parent educators worldwide. Families enter PAT services through referral sources including (1) medical/health providers (e.g., health clinic, health department, hospital, doctor, pediatrician, or health ambassador), (2) PAT recruitment events, (3) early childhood programs (e.g., WIC, child care program, early intervention program, or other home visiting program), (4) child protective services (generally non-mandated services), (5) other social services (e.g., employment services, housing authority, immigration services, substance use services, TANF, etc.), (6) school-based referral, (7) family/friend referral, (8) self-referral, (9) community agency or event, or (10) other referral sources (e.g., tribal organization, social media, or other). A full analysis of differences between referral sources pre- and during COVID 19 can be described by Authors (Under Review).

### Transition to Virtual Home Visitation Services

Prior to the COVID-19 pandemic, investigators at the University of Southern California and PAT National Center had pilot tested a virtual home visitation (VHV) workforce training protocol that resulted in training 20 home visitors to offer 2000 VHV visits through interactive video conferencing (Traube et al., 2020). The pilot demonstrated PAT could be delivered with fidelity using interactive video conferencing (Traube et al., 2020). Once the COVID-19 pandemic occurred and social distancing measures were enacted, a Rapid Response to Virtual Home Visitation (RR VHV) collaborative was created. This industry-wide collaborative was led by a partnership of the Institute for the Advancement of Family Support Professionals, PAT National Center and the National Alliance of Home Visiting Models. RR VHV created a streamlined process for information gathering and sharing, including practice briefs, webinars, and technical assistance guidance related to VHV service delivery. All information and resources shared were designed to meet the needs of all HV professionals delivering all HV models, provided free of charge, and will remain available to support future needs of the field.

### Study Design

Data were collected using PAT's HIPAA-compliant data management system, "Penelope," which is designed to store and connect data at the child, parent, and family levels.

Relevant family-level data for this study included family-centered assessment results and family high-needs characteristics. Relevant parent/guardian-level data included parental depression screenings. PAT affiliates are able to select from a list of approved parental depression screening tools to administer with their families. The tools have various cut off points to determine depression and the PAT model defers to the local affiliate to determine a cut off based on the tool they are using, recommendations from the tool, and guidance from the literature.

## Participants

This study examined differences in depression screening rates and maternal depressive symptoms between families enrolled in PAT before and after the onset of the COVID-19 pandemic. We also looked at differences in family demographics and risk characteristics. We restricted our analyses to families who were enrolling in PAT for the first time since the majority of data about the family is collected during the first 90 days of services. The date of depression screening administration varies depending on local PAT affiliates or funder requirements; however, PAT has a quality standard that maternal depression screening be conducted at least annually, and most major funders require completion within 90 days of enrollment or after birth.

To examine whether there were differences in the number of mothers being screened for depression, as well as maternal depressive symptoms, we chose time periods during the same months pre to post-pandemic onset to mitigate any seasonal effects. This also corresponded with the implementation of virtual home visitation protocols during the COVID-19 pandemic. Hence, our final subsamples were families enrolled during the pre-pandemic period (defined as March 16th to July 27th, 2019,  $n=4,743$ ) and the post-pandemic period (defined as March 16th to July 27th, 2020,  $n=2,049$ ). This sample includes 350 PAT affiliates from 38 different states. All study protocols were approved through the University of Southern California Institutional Review Board (UP-16–00,089).

## Measures

### Family Demographics and High Needs Characteristics

Information about family demographics and high needs characteristics were assessed using the PAT *Family Intake Record* and *Family Information Record*. Family demographics included family language (English vs. Spanish) and maternal race/ethnicity (Race=Black/African American, Asian, White, More than one race, American Indian/Alaskan Native, or Native Hawaiian/Other Pacific Islander; Ethnicity=Hispanic/Latino vs. Other). Family risk factors included the following: (1) child with disability or chronic health condition (child has a significant delay,

disability, or condition that impacts developmental domains and/or affects overall family well-being), (2) young parent or caregiver (pregnant or parenting under the age of 21), (3) parental disability or health condition (parent has a physical or cognitive impairment that substantially limits his or her ability to parent as determined by the parent or home visitor), (4) parental mental health condition (parent has a thought, mood, or behavioral disorder associated with distress and/or impaired functioning, as determined by parent report, positive screening, or a diagnosis), (5) low income status (family is eligible for free and reduced lunches, public housing, child care subsidy, WIC, food stamps/SNAP, TANF, Head Start/Early Head Start, and/or Medicaid), (6) low education status (parent did not attain high school diploma or equivalency), (7) recent immigrant or refugee family (one or both parents is foreign-born and entered the country within the past 5 years), (8) parental substance use disorder at any point during the child's lifetime (including prenatally) or current substance abuse, (9) foster care or other temporary caregiver (child or young parent is in foster care, has court-appointed legal guardians, or is living in some other temporary caregiver condition), (10) reported or substantiated abuse or neglect of child or sibling for any reason, (11) housing instability including homelessness, couch-surfing, or living in shelters or hotels, (12) history of parental incarceration during the child's lifetime (federal or state prison, local jail, halfway house, boot camp, etc.), (13) very low birthweight/preterm birth (birth weight is under 1500 g or 3.3 pounds and the child was born at less than 37 weeks' gestation for children under the age of 2), (14) death in the immediate family at any point during the child's lifetime or prenatally, (15) intimate partner violence at any point during the child's lifetime or prenatally per parent self-report, positive screening, or court proceedings (including physical, sexual, psychological violence, and economic coercion), and (16) military deployment (planning for military deployment, currently deployed, or has experienced deployment within the past two years). These risk factors map on to target populations identified through the federal government for the MIECHV program (Maternal, Infant, and Early Childhood Home Visitation Program (MIECHV), 2020).

### Maternal Depression

Information regarding maternal depressive symptoms was drawn from the name of the depression screening tool administered and the mother's score. Out of all depression screening tools, this analysis only focused on the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987), and the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001), since the majority of mothers (86%) were screened with one of these two tools. For the purposes of this analysis, maternal depressive symptoms were categorized using two cut-offs; a cut-off of 13 or higher was used to indicate whether the mother met probable criteria for depression on the EPDS, and a score of 10 or higher was used on the PHQ-9.

## Analytic Strategy

All statistical analyses were conducted in STATA version 15.1. Overall, there were low levels of missing data in this sample. Data were missing for family language (2.2%), and maternal race (10.4%) and ethnicity (10.4%), but there were no missing data in terms of family risk factors. First, we examined whether there were differences in family demographics and the number and type of family risk factors for families enrolled before and after the onset of the pandemic using simple linear and logistic regressions, which accounted for clustering by PAT site. Second, we assessed how many mothers in PAT were screened for depression pre and post COVID-onset using either the EPDS or PHQ-9. Third, simple logistic regressions that accounted for clustering were conducted to examine whether there were statistically significant differences in the rates of maternal depression screenings pre and post pandemic-onset, and whether there were significant differences in maternal depressive symptoms before and after the onset of the pandemic. For all of these analyses, Cohen's *d* and *h* were calculated as measures of effect size. Fourth, we examined whether there were differences between mothers screened or not screened for depression in the post-pandemic period. Fifth, we calculated the number of mothers who met the clinical cut-off for probable depression on either the EPDS or the PHQ-9. Lastly, we examined differences in associations between family risk factors and positive depression screenings in each period using logistic

regression that accounted for clustering, and reported odds ratios as effect sizes.

## Results

Before the onset of the COVID-19 pandemic, the majority of PAT home visits were conducted in person. During the pandemic, 35.9% of visits or groups were classified as phone/telecommunication, 34% were videoconferencing, 15.9% were text/email, and only 8.5% occurred in person.

Results showed that there were no significant differences in terms of family language (English vs. Spanish) or maternal race or ethnicity before and during the pandemic. Overall, families who enrolled in PAT after the onset of the COVID-19 pandemic did not differ from the pre-pandemic families on the total number of risk factors. However, when looking at the risk factors individually, families enrolled during the pandemic were significantly less likely to be impacted by housing instability, have a child with a disability or health condition, or be involved with the military, and more likely to have a history of child abuse or neglect, compared to families enrolled during the same period the previous year. The greatest difference between the pre- and post-pandemic periods was whether families endorsed having a history of child abuse or neglect (see Table 1).

**Table 1** Comparison of risk factors among families enrolled before and after onset of the COVID-19 pandemic (*n* = 6,792)

Risk factor	Pre-pandemic	During the pandemic	Sig. ( <i>p</i> )	Cohen's <i>d/h</i>
	( <i>n</i> = 4,743) <i>n</i> (%)	( <i>n</i> = 2,049) <i>n</i> (%)		
Low parental education	1004 (21.2)	431 (21.0)	.242	.00
Low family income	3430 (72.3)	1416 (69.1)	.320	-.07
Young parent/caregiver	632 (13.3)	285 (13.9)	.284	.02
Child disability or health condition	546 (11.5)	173 (8.4)	< .001	-.10
Intimate partner violence exposure	318 (6.7)	135 (6.6)	.979	.00
History of parental mental illness	766 (16.2)	347 (16.9)	.372	.02
Parental substance abuse	446 (9.4)	228 (11.1)	.739	.06
Parental disability/health condition	380 (8.0)	175 (8.5)	.443	.02
Recent immigrant	313 (6.6)	119 (5.8)	.308	-.03
Foster care/temporary caregiver	211 (4.4)	89 (4.3)	.585	.00
Housing instability	487 (10.3)	147 (7.2)	.002	-.11
Parental incarceration	238 (5.0)	103 (5.0)	.860	.00
Low birth weight/preterm	166 (3.5)	87 (4.2)	.162	.04
History of child abuse/neglect	343 (7.2)	227 (11.1)	.001	.14
Military deployment	56 (1.2)	14 (0.7)	.048	-.05
Death in immediate family	124 (2.6)	53 (2.6)	.916	.00
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )		
Total # of risk factors	2.0 (1.6)	2.0 (1.6)	.756	.01

The pre-pandemic period was defined as March 16, 2019, to July 27, 2019 and the post-pandemic period was defined as March 16, 2020, to July 27, 2020. *P*-values are based on separate simple linear and logistic regression models that accounted for clustering

**Table 2** Comparison of maternal depression in the pre- and post-pandemic onset periods ( $n = 6,792$ )

Variable	Pre-pandemic onset	Post-pandemic onset	Sig. ( $p$ )	Cohen's $d/h$
Maternal depression (EPDS and PHQ-9)				
Mothers screened for depression ( $N$ , %)	1,474 (31.1)	605 (29.5)	.045	-.03
Maternal depression score ( $M$ , 95% $CI$ )	5.12 [4.8, 5.6]	4.32 [4.0, 5.1]	.015	-.15

The pre-pandemic period was defined as March 16, 2019, to July 27, 2019 and the post-pandemic period was defined as March 16, 2020, to July 27, 2020.  $P$ -values are based on separate linear and logistic regression models that accounted for clustering

**Table 3** Demographic characteristics/risk factors before and during the COVID-19 pandemic and association with positive depression screenings ( $n = 2,079$ )

	Pre-pandemic				During the pandemic			
	No. (%) <sup>a</sup>		OR	Sig. ( $p$ ) <sup>c</sup>	No. (%) <sup>a</sup>		OR	Sig. ( $p$ ) <sup>c</sup>
	Screened for depression ( $n = 1474$ )	Positive screening <sup>b</sup> ( $n = 207$ )			Screened for depression ( $n = 605$ )	Positive screening <sup>b</sup> ( $n = 64$ )		
<b>Maternal race</b>								
White	844 (57.3)	121 (14.6)	1.00	.965	343 (56.7)	39 (11.6)	0.84	.203
Black or African American	370 (25.1)	50 (13.7)			157 (26.0)	17 (11.0)		
Asian	39 (2.6)	5 (12.8)			8 (1.3)	0 (0.0)		
American Indian/Alaska Native	55 (3.7)	10 (18.9)			29 (4.8)	2 (6.9)		
Native Hawaiian or other Pacific Islander	8 (0.5)	0 (0.0)			0 (0.0)	0 (0.0)		
More than one race	65 (4.4)	10 (15.4)			32 (5.3)	2 (6.3)		
<b>Maternal ethnicity</b>								
Hispanic/Latino	446 (30.3)	37 (8.5)	0.55	<.001	158 (26.1)	7 (4.6)	0.34	.003
Not Hispanic/Latino	981 (66.6)	163 (16.9)			426 (70.4)	55 (13.0)		
<b>Family language</b>								
English	1142 (77.5)	184 (16.4)	2.58	<.001	488 (80.7)	60 (12.4)	3.00	.020
Spanish	283 (19.2)	17 (6.2)			105 (17.4)	4 (4.0)		
<b>Family income level</b>								
Low income	1195 (81.1)	188 (16.0)	1.94	.002	502 (83.0)	55 (11.2)	1.27	.481
Not low income	279 (18.9)	19 (7.0)			103 (17.0)	9 (8.7)		
<b>Intimate partner violence (IPV)</b>								
Exposed to IPV	117 (7.9)	34 (29.8)	2.78	<.001	46 (7.6)	13 (28.3)	4.03	<.001
No exposure to IPV	1357 (92.1)	173 (13.0)			559 (92.4)	51 (9.3)		
<b>Parental substance abuse</b>								
Current or previous substance abuse	155 (10.5)	37 (24.7)	2.01	.001	85 (14.0)	11 (12.9)	1.25	.526
No substance abuse	1319 (89.5)	170 (13.1)			520 (86.0)	53 (10.4)		
<b>Parental physical health</b>								
Parent has disability/health condition	137 (9.3)	30 (22.6)	1.73	.017	52 (8.6)	6 (11.8)	1.06	.903
No parental disability/health condition	1337 (90.7)	177 (13.5)			553 (91.4)	58 (10.6)		
<b>Housing stability</b>								
Experiencing housing instability	155 (10.5)	37 (24.5)	2.22	<.001	48 (7.9)	5 (10.6)	0.99	.984
Experiencing stable housing	1319 (89.5)	170 (13.1)			557 (92.1)	59 (10.7)		
<b>Parental incarceration</b>								
History of parental incarceration	72 (4.9)	13 (18.6)	1.33	.378	36 (6.0)	9 (25.0)	3.07	.007
No history of parental incarceration	1402 (95.1)	194 (14.1)			569 (94.0)	55 (9.8)		

The pre-pandemic period was defined as March 16, 2019 to July 27, 2019 and the post-pandemic onset period was defined as March 16, 2020 to July 27, 2020

<sup>a</sup>Categories and percentages may not add up to the total due to missing data

<sup>b</sup>A positive depression screening was defined as either  $\geq 10$  on the PHQ-9 or  $\geq 13$  on the EPDS. Percentages reflect the number of mothers who met criteria for depression / number of mothers screened

<sup>c</sup> $P$ -values are based on separate simple linear and logistic regression models that accounted for clustering

In terms of depression screenings, 31.1% of mothers enrolled in PAT in the pre-pandemic period were screened for depression using the EPDS or PHQ-9, whereas this declined to 29.5% of mothers during the pandemic. This difference is statistically significant ( $p < .05$ ), see Table 2. Furthermore, there was a significant difference in maternal depressive symptoms before and after the onset of the pandemic, with mothers scoring 5.17 on average pre-pandemic and 4.52 after the onset of the pandemic ( $p < .05$ ), see Table 2. Mothers who were screened for depression in the post-pandemic period were more likely to have a higher number of overall family stressors (2.13 vs. 1.92), be low income (35.5% vs. 16.3%), and have low family education (38.1% vs. 27.3%), than those who were not screened for depression.

Lastly, associations between family demographics or risk factors and positive depression screenings showed some similar and divergent trends during the two periods. For example, before and during the pandemic associations between race, ethnicity, language and meeting the clinical cut-off for depression showed similar patterns (see Table 3). The association between maternal race and depression status was not significant in either the pre- or post-pandemic onset periods. However, Hispanic/Latino mothers were significantly less likely to meet criteria for depression during both periods, and results showed that the difference was greater after the onset of the pandemic. Similarly, mothers from Spanish-speaking families were half as likely to meet criteria for depression before the pandemic (6.2% vs. 16.4%), and a third less likely to meet criteria after the onset of the pandemic (4.0% vs. 12.4%), compared with English-speaking families (see Table 3).

In terms of family risk, there were several factors that were only associated with increased likelihood of meeting criteria for depression in the pre-pandemic period, including low family income, parental substance abuse, parent physical health problems, and housing instability (see Table 3). In contrast, having a history of parental incarceration was only associated with an increased risk of meeting criteria for depression after the onset of the pandemic. During this period, mothers who reported that the family had a history of incarceration were more than twice as likely to meet criteria for depression (25%) than mothers who did not (9.8%). Lastly, exposure to intimate partner violence was associated with greater risk for depression both before and after the onset of the COVID-19 pandemic, however the association was stronger during the pandemic (see Table 3). Before the pandemic, mothers exposed to IPV were more than twice as likely to meet the clinical cut-off for depression, and this increased to three times as likely during the pandemic. The remaining family risk factors were not associated with meeting the cut-off for depression in either period.

## Discussion

The purpose of this study was to explore differences in early childhood home visitation service provision (enrollment and depression screening) among mothers receiving home visitation services prior to and after the onset of the COVID-19 pandemic. Additional factors related to receipt of virtual home visitation services, family risk factors, and maternal depressive symptoms were examined.

Early childhood home visitation has been a federally funded avenue for early detection and intervention of maternal depression, among other early childhood and parenting outcomes. All home visitation programs that receive MIECHV federal funding are required to offer maternal mental health screening regardless of the home visitation model being deployed (Maternal, Infant, and Early Childhood Home Visitation Program (MIECHV), 2020). The effectiveness of virtual home visitation during COVID-19 still needs to be determined. Therefore, this study sought to explore differences in family risk factors, rates of maternal depression screenings, and the percentage of mothers meeting criteria for depression among mothers receiving home visitation services before and after the onset of the COVID-19 pandemic. Analysis of participants from one of the largest national home visitation models in the USA revealed that there was a significant enrollment reduction in the early childhood home visitation program after the onset of the pandemic, with enrollment dropping by 57% when compared to the same time period prior to the COVID-19 pandemic. While a reduction in service utilization was to be expected at the onset of social distancing measures, this drop in enrollment raises the question of whether this trend will persist throughout the COVID-19 pandemic or if early childhood home visitation programs can more effectively engage families in virtual services. Furthermore, this enrollment reduction also indicates that many families did not receive preventive and protective services and screening offered through early childhood home visitation programs during the pandemic. This has the potential to have long-term impacts on family stress and child development. Prior research has indicated that strategies for recruitment and enrollment in early childhood home visitation must be modified when applied to virtual home visitation as typically targeted families may not be able to envision the format of services being offered (Traube et al., 2020).

Many home visitation programs may be impacted by the “digital divide” that refers to the inequality in access to technology that exists between communities due to regional and demographic differences, particularly among socio-economic groups. The COVID-19 pandemic highlights the need for families to communicate through internet access

and the disparities created due to the digital divide (Hall & Bierman, 2015).

Overall, families enrolling in PAT after the onset of the COVID-19 pandemic appear to have the same average number of risk factors, yet show a decreased likelihood of endorsing housing instability, having a child with a disability or health condition, or being involved with the military, and an increased likelihood of having a history of child abuse or neglect. In terms of these risk factors, the greatest difference pre- and post-COVID onset was observed for families having a history of child abuse or neglect. Families with risk factors or histories of maltreatment have primarily received services in the home where their needs and skills are addressed in the natural environment. As previously noted, COVID-19 essentially stopped in-home services, as well as family contact with other key service systems (daycare, schools) that directly or indirectly assess and address child maltreatment (Baron et al., 2020; Jonson-Reid et al., 2020). Access to virtual home visitation is one of the few options available to families at risk for child maltreatment and that appears to be reflected in the consistent referral rate of families with child maltreatment as a risk factor. Furthermore, the fact that these clients are often court mandated to attend services, increases the likelihood they will follow through with enrollment.

The reduction in enrollment from other groups of high-risk families is understandable given that there are significant barriers to participation in home visiting for families experiencing housing instability and those who have a child with a disability or health problem (Bower et al., 2020). It is also possible that military-involved families have sought services elsewhere during the pandemic or have also experienced barriers to participating in virtual home visitation. In addition to contextual risk factors based on family demographics, rapport and connection with a home visitor are also acknowledged barriers to engaging in home visitation (Bower et al., 2020). Families who did not have previous familiarity with home visitation services may be less likely to engage in these services because of lack of familiarity with the virtual service delivery modality and lack of pre-established connection to a provider. Home visiting programs may want to consider implementing targeted outreach efforts to engage at-risk groups that are less likely to enroll in virtual home visiting services during the on-going pandemic. For example, establishing or revisiting referral pathways that might target these groups (homelessness/supportive housing programs, regional centers and other early intervention programs, etc.) could bolster identification of high needs families. Alternative use of online recruitment strategies through websites and social media may also be necessary as individuals interact less with social service providers during COVID-19.

A decline in enrollment of some high-risk families is important information to note because of the wide

documentation that high-risk mothers are at greater risk for developing postpartum depression or other post-natal mental health difficulties (Silverman et al., 2017). Although emerging data shows that rates of maternal depression appear to be increasing among the general population in the prenatal and postpartum periods as a result of the pandemic (Berthelot et al., 2020; Davenport et al., 2020), our results show that overall mothers enrolling in home visiting after the onset of the pandemic reported lower levels of depressive symptoms. Given that early childhood home visitation is one of the principal safety nets for early detection of PPD, a decrease in PPD in home visitation programs warrants future exploration. It is possible that at a time when social interaction and support is limited, virtual home visitation is filling a significant element of social support for mothers of young children, thus mitigating the emotional impact of the pandemic. However, the more likely explanation is that because virtual home visitation is currently attracting some populations of mothers who are experiencing fewer stressors (e.g., significantly less likely to be impacted by housing instability, have a child with a disability or health condition, or be involved with the military) overall mothers are at decreased risk for exhibiting PPD symptoms. Furthermore, there may be aspects of the virtual depression screening experience that make detection more difficult. The decreased mental health screening rates in this sample during the COVID-19 pandemic may also indicate a challenge in virtual screening and service delivery such that home visitors have to focus more of their attention on identifying and addressing basic needs including food, shelter, and employment, leaving less time for assessments. The fact that home visitors continue to screen high-risk mothers at a higher rate than the general sample population is positive. There is the potential that high-risk mothers are not adequately being identified or assisted in enrolling in home visitation. However, once enrolled home visitation programs, service providers appear to be triaging appropriately, but more attention could be given to universal mental health screening during this time of heightened mental health risk.

Findings also raise concern about specific high-risk groups enrolling in PAT like mothers exposed to intimate partner violence (IPV), since IPV exposure was more strongly associated with maternal depressive symptoms in this sample after the onset of the pandemic, compared to the pre-pandemic period. A recent systematic review and meta-analysis found that reports of suspected IPV increased during the pandemic due to stay-at-home and lockdown orders (Piquero et al., 2021), highlighting the need for home visitation programs to screen for IPV and address physical and emotional safety for families. Similarly, families with a history of parental incarceration emerged as another population of concern since this risk factor was only strongly associated with maternal depressive symptoms during the pandemic. At the height of the



pandemic in the USA, COVID-19 spread rapidly in correctional facilities and families of incarcerated individuals were often unable to communicate with or visit family members, which could have contributed to psychological distress (Tadros et al., 2021). The association between parental incarceration and heightened maternal depressive symptoms underscores the importance of tailoring home visiting services to address the unique needs and stressors of each family.

This study should be examined within the contexts of its limitations. First, this study represents only a portion of Parents as Teachers programs who utilize the Penelope data collection system. Therefore, there may be programmatic data not reflected in this analysis. PAT does not require affiliates to use their Penelope data system as some states and funders require the use of other data systems. The 350 affiliates in this study represent 38 different states, including affiliates housed in multiple types of organizations including school districts, community action organizations, health organizations, and non-profit organizations. Additionally, the affiliates were serving families in geographically diverse communities including frontier, rural, suburban, urban, and tribal communities. Given that the study data reflects great diversity in terms of families served, geography, and funding source, and that the analyses take this variability into account, we believe these findings are still applicable to the larger field of early childhood home visitation. However, because there is no comparison data available for PAT affiliates using other data systems, it is impossible to statistically verify any potential differences in this sample. Moreover, because there are few protocols for virtual home visitation, recruitment, enrollment, and depression screening variations in all three could impact the outcomes noted in this study. PAT does have a robust quality assurance and monitoring process that supports affiliates. Essential Requirements and Quality Standards guide programs in adopting best practice and PAT collects annual program data from all of their affiliates through the comprehensive Affiliate Performance Report, where the national center measures compliance with the Essential Requirements. Every fourth year of implementation, PAT affiliates complete a comprehensive Quality Endorsement and Improvement Process, which includes a review of Essential Requirements, a submission of a self-study demonstrating how they are meeting the Quality Standards. These practices should allow for consistency in data collection across affiliates.

An additional study limitation is that some affiliates utilized the Patient Health Questionnaire, 9-item while others used Edinburgh Postnatal Depression Scale. This occurred because PAT affiliates select their screening tools based on

funder requirements. There is potential discord between the two measures with the PHQ-9 capturing more somatic symptoms, while EPDS detects depressive symptoms (Zhong et al., 2014). However, both tools have been determined to have a comparable sensitivity, specificity, PPV and NPV for both pregnant and postpartum women (Flynn et al., 2011; Yawn et al., 2009; Zhong et al., 2014), there was no way to verify concordance in this data set. Despite these limitations, we believe this study provides a realistic comparison of the change in maternal mental health screening in early childhood home visitation prior to and during the COVID-19 pandemic.

This study describes one portion of the early childhood safety net (early childhood home visitation) where mothers at risk for PPD should be engaged and screened for mental health need. Due to service disruptions and substantial stressors spurred by the COVID-19 pandemic, it appears that early childhood home visitation providers need to further refine protocols and strategies for screening mothers for PPD using virtual home visitation services. Future research should qualitatively explore families and home visitors' views and experiences regarding the virtual depression screening process to identify barriers and facilitators to effective screening and referral. Furthermore, an examination of referral rates from home visitation to mental health providers after the onset of the pandemic is warranted to determine whether there are difficulties in identifying and linking mothers to telemental health services. Furthermore, specific risk factors like IPV exposure and parental incarceration demonstrated stronger associations with maternal depression after the pandemic, highlighting the continued importance of tailoring home visitation services to each family's unique needs.

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## Declarations

**Ethics Approval** All study protocols were approved through the University of Southern California Institutional Review Board (UP-16-00089). The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

**Consent to Participate** Informed consent was obtained from all individual participants included in the study.

**Conflict of Interest** Allison Kemner, MPH is employed by Parents as Teachers. Any conflict of interest was mitigated by ensuring a robust study team equally reviewed all study conclusions. Ms. Kemner's primary role was to assist the team in accessing study data, identifying data components, and authoring the description of the Parents as Teachers affiliates and Penelope data system.

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