

Postpartum Depressive Symptoms in Low-Income Latinas: Cultural and Contextual Contributors

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Objective: Using a conceptual model of postpartum depression risk in Latinas including both contextual and cultural stressors, we tested contributions to depressive symptom levels and trajectories over the course of 1 year following birth in a community sample of Latinas. **Method:** A multisite sample of low-income U.S.-born and foreign-born Latinas ($n = 537$; M age = 25.70) was interviewed on many topics including measures of stress and maternal health at 1, 6, and 12 months postpartum. Nested multilevel growth curve models were implemented to test associations of contextual stressors (poverty, domestic violence) with trajectories of depressive symptoms, adjusting for confounds. This model was compared to 1 that added cultural stress variables (everyday discrimination, foreign-born status, language preference, age at immigration) measured 1-month postpartum. **Results:** The best fitting model provided evidence for the independent effects of cultural and contextual stressors. Discrimination ($\beta = .13$ $SE = .02$, $p = < .001$) and domestic violence ($\beta = .39$ $SE = .09$, $p = < .001$) predicted trajectories with higher levels of depressive symptoms 1 month postpartum, but not linear change in symptoms over the year. **Conclusions:** The present study provides evidence that discrimination, a cultural factor, and domestic violence, a contextual factor, each predict higher levels of early postpartum depressive symptoms. Interventions addressing discrimination and maternal safety are recommended.

Public Significance Statement

This study highlights the importance of contextual and cultural stress in understanding postpartum depressive symptoms in low-income Latinas. Discrimination and domestic violence warrant further consideration in ethnic minority women when planning clinical and community interventions, especially in pregnancy when addressing stressors may prevent postpartum depressive symptoms.





Keywords: Latina, postpartum depression, discrimination, domestic violence, longitudinal

Postpartum depression is associated with adverse maternal and child outcomes (O'Hara & McCabe, 2013). Mothers with symptoms of depression following birth are more likely to have subsequent depressive episodes and to engage in hostile and unresponsive parenting behaviors (Brummelte & Galea, 2016). Their

offspring have an increased risk for cognitive deficits, psychopathology, and poorer physical health from early childhood to adolescence (Field, 2010; Pearlstein, Howard, Salisbury, & Zlotnick, 2009). Estimates of the prevalence rates of postpartum depression are between 7 and 19% (Gavin et al., 2005), although differential rates by ethnicity are not well-established.

Nationally representative data describing rates of depression for women by ethnicity are mixed. Some show that Latinas have higher prevalence rates of depression than do White women (Broberger, Harlow, Avis, Kravitz, & Cordal, 2004) and others that White women have higher rates (Guo, Robakis, Miller, & Butwick, 2018). Regarding postpartum depression, some studies report elevated symptoms of postpartum depression in Latinas compared to non-Latina Whites (Howell, Mora, Horowitz, & Leventhal, 2005) especially foreign-born Latinas (Fung & Dennis, 2010; Lucero, Beckstrand, Callister, & Sanchez Birkhead, 2012), while other studies report no ethnic differences (Liu & Tronick, 2012; Yonkers et al., 2001). Population-based surveys

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administered in the United States have shown that Latinas are two times more likely to be diagnosed with postpartum depression than White women, with rates of 7.8% versus 3.3%, respectively (Liu & Tronick, 2013). Further, Latinas with postpartum depression are significantly less likely to access mental health care when they experience symptoms (Chang, Tabet, Elder, Kiel, & Flick, 2016; Kozhimannil, Trinacty, Busch, Huskamp, & Adams, 2011), and have been identified as a group at heightened risk for perinatal depression (Muñoz et al., 2007).

The significance of this health disparity is magnified because Latinas are the largest ethnic minority group in the United States and account for 18% of the population (Pew Research Center, 2017). In 2016, Latina mothers gave birth to over 900,000 babies in the U.S, a birthrate 31% greater than the national average (Martin, Hamilton, Osterman, Driscoll, & Drake, 2018). Thus, the study of Latina mental health during the perinatal period is of high importance.

Taking a biopsychosocial conceptual approach to risk of postpartum depression, Lara-Cinisomo and colleagues (2016) outline two primary pathways that lead to adverse physiological and psychological outcomes for Latinas living in the United States. The *contextual stress pathway* considers the stressors that arise from the broader social environment (e.g., poverty, trauma) which have an effect on PPD symptoms regardless of ethno-racial membership. While the *cultural stress pathway* considers stressors common among Latinas individuals living in the United States because of their ethnicity and migration history, such as limited English proficiency and discrimination. Contextual and cultural pathways independently and interactively predict risk for postpartum depressive symptoms. In this article, we test only the contextual and cultural pathways (excluding biomarkers), in an effort to further refine the psychosocial predictors included in conceptual model in two ways. First, by examining the proposed predictors of cultural and contextual stress longitudinally in order to strengthen their causal links to postpartum depression. Second, by testing the effects of cultural stress, over and above contextual stress to better understand the relative effects of each pathway on postpartum depressive symptom trajectories.

Contextual Stress

Latinas in the United States are at heightened risk for living in poverty, and in 2015 about one in five Latinas lived in poverty as compared to 9.6% of White women (Tucker & Lowell, 2016). Low-income women of primarily Latinas decent living in the United States have shown rates of postpartum depression diagnoses two times higher than women of middle income (Yonkers et al., 2001). In a community sample of 106 low-income Dominican and Puerto Rican pregnant women, 43% reported mild to moderate depressive symptoms during their third trimester, and an additional 10% reported severe depressive symptoms (Zayas, Jankowski, & McKee, 2003), a striking finding given the strong associations between prenatal and postnatal depressive symptoms (Robertson, Grace, Wallington, & Stewart, 2004). Additionally, in study of 1,662 recent mothers, financial hardship was found to triple the risk for postpartum depressive symptoms and explained the greatest amount of variability in symptoms for Black and Latina women (Rich-Edwards et al., 2006). Finally, results from qualitative studies reveal that women living in poverty often discuss financial

worries as the perceived cause of their depression during the postpartum period and view their poverty as a maternal failure (Abrams & Curran, 2011). These findings suggest that poverty is a robust contextual risk factor for postpartum depression in the general population, and a factor that may increase risk disproportionately in minority populations, given higher rates of financial hardship in these groups.

Domestic violence is another factor that is central to existing conceptual frameworks of postpartum depression in Latinas, considered a lifetime trauma (Lara-Cinisomo, Girdler, Grewen, & Meltzer-Brody, 2016). Previous research has focused on intimate partner violence (IPV; Beydoun, Beydoun, Kaufman, Lo, & Zonderman, 2012). Though rates of IPV are similar among Latinas and non-Latina white women (Breiding, Chen, & Black, 2014), Latinas who experience IPV tend to be younger, have more socioeconomic disadvantage than their non-Latina-white counterparts and be more fearful of seeking help from authorities (Bauer, Rodriguez, Quiroga, & Flores-Ortiz, 2000; Klevens, 2007; Lipsky, Caetano, & Roy-Byrne, 2009). IPV clearly contributes to depressive symptoms among Latinas irrespective of its temporal proximity to the pregnancy. For example, Latinas who experienced IPV in the year prior to their pregnancy report higher postpartum depressive symptoms (Valentine, Rodriguez, Lapeyrouse, & Zhang, 2011), as do Latinas who endorse experiences of IPV during their pregnancy (Jackson et al., 2015), and at any point in their past (Rodriguez et al., 2008; Rodríguez et al., 2010). However, there is also evidence that physical and sexual abuse perpetrated by a nonromantic partner (e.g., family member) prior to (Silverman & Loudon, 2010) or during a woman's pregnancy (Jasinski, 2004) are associated with depressive symptoms in the postpartum period. Because Latina mothers in the United States are more likely than other racial-ethnic groups to live in homes with multiple adult family members, examining domestic violence, which extends beyond violence perpetrated by an intimate partner is an important extension of the study of violence and postpartum depression in this group (Tamis-Lemonda & Kahana-Kalman, 2009).

Cultural Stress

Discrimination constitutes a cultural stressor commonly encountered by Latinas (Lee & Ahn, 2012) based on factors like language, accent, skin color, and immigrant status, and it contributes to poorer mental health outcomes in this group (Araújo & Borrell, 2006; Torres & Ong, 2010; Williams, Neighbors, & Jackson, 2003). Discrimination is reliably associated with greater risk for depression in ethno-racial minority women (Belle & Doucet, 2003; Canady, Bullen, Holzman, Broman, & Tian, 2008; Greer, 2011; Schulz et al., 2006), and heightens risk for delivering preterm birth (Fryer, Vines, & Stuebe, 2019; Mustillo et al., 2004) and low birth weight babies (Collins et al., 2004)—independent risk factors for postpartum depression (Bugental, Beaulieu, & Schwartz, 2008; Treyvaud, Lee, Doyle, & Anderson, 2014). Though relationships between discrimination and depression remain understudied in the perinatal period, research on African American women has shown that everyday racial discrimination during pregnancy and postpartum is associated with adverse mental health outcomes. In one large prospective study, African American women's experiences of interpersonal discrimination during the first trimester were associated with more depressive symptoms at midpregnancy (Ertel

et al., 2012). This same pattern emerged in a sample of African American and Latina mothers studied postpartum; that is, women who reported more lifetime discrimination also reported more depressive symptoms in the year after giving birth (Surkan, Peterson, Hughes, & Gottlieb, 2006). Latinas and African American women encounter more instances of discrimination than white women due to intersectional experiences of discrimination, or gendered racism, which has been linked to increased stress during the perinatal period (Rosenthal & Lobel, 2018). Taken together, the literature on discrimination indicates that it is a prevalent stressor with a unique influence on adverse outcomes in the postpartum period.

Place of birth, or *nativity*, is a sociodemographic variable and a proxy for one form of cultural stress associated with Latinas' risk for postpartum depression. A recent meta-analysis found that immigrant women have 1.5 to 2 times greater risk of postpartum depression compared to women born in the United States. (Falah-Hassani, Shiri, Vigod, & Dennis, 2015). Bashiri and Spielvogel (1999) suggest that cultural differences surrounding birth and postpartum practices increase an immigrant woman's risk for postpartum depressive symptoms. These cultural differences are exacerbated by the fact that many immigrant women are separated from important sources of extended family support during pregnancy, birth and postpartum. However, effects of foreign-born status may depend on the age at which an individual immigrates to the United States. In a nationally representative sample of 2,554 Latinx in the United States, Alegria and colleagues (2007) reported that arrival to the United States at age 7 or younger among women was associated with a lower risk for depression as compared to women who arrived later in life, due in part to fewer barriers to upward mobility and English language acquisition.

Finally, although findings are mixed, language preference has also garnered attention as a risk factor for postpartum depression in Latinas. In some cases, English language preference is associated with an increased risk (Davila, McFall, & Cheng, 2009; Martinez-Schallmoser, Telleen, & MacMullen, 2003). However, other studies have reported that Latinas' language preference is unrelated to postpartum depression risk (Beck, 2006; Valentine et al., 2011; see also Heilemann, Frutos, Lee, & Kury, 2004). The discrepant findings regarding language preference may be better understood if we consider that language preference is often used as a proxy for acculturation. Acculturation is a construct that describes the dual process of cultural and psychological change that results from contact between two cultures (Berry, 2005). Though using language as a proxy measure of acculturation has been criticized for focusing on only one behavioral aspect of culture (Lopez-Class, Castro, & Ramirez, 2011), a psychometric evaluation of single-item language measures show that they can in fact provide a brief and valid measure of acculturation (Mills, Malcarne, Fox, & Sadler, 2014).

Within the Latinx community, acculturation is simultaneously associated with adverse health behaviors and mental health outcomes during the perinatal period, and with increased health care utilization (Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). Thus, it is possible that Latinas who show a preference for English language are at a higher risk for postpartum depression because their greater acculturation has coincided with behavioral changes that contribute to the loss of privileged health status found in less acculturated women (i.e., the immigrant health paradox). However, Spanish speaking women, who may be less acculturated,

can encounter difficulties navigating new perinatal systems of care (Shaffer, 2002) and may lack the social support available to them in their countries of origin (McGlade, Saha, & Dahlstrom, 2004). In sum, findings remain inconclusive as to whether language preference accounts for variability in PPD symptoms in Latinas and suggest a need to better measure acculturation in studies of perinatal mental health.

Present Study

The present study's aims were twofold. First, we sought to further document the frequency, severity, and types of discrimination encountered by Latina mothers, because this stressor is understudied in relation to the postpartum experiences of Latinas. Second, based on the hypothesized contextual and cultural stress pathways to postpartum depressive symptoms identified by Lara-Cinisomo et al. (2016), we examined whether poverty, exposure to domestic violence, discrimination, foreign-born status, English language preference, and age of immigration are associated with trajectories of postpartum depressive symptoms. Further, we tested whether cultural stressors would provide a better fitting model of symptom trajectories over and above a model considering only contextual stressors. These aims were tested in a community sample of low-income U.S.-born and foreign-born Latinas from various regions of the United States who were studied longitudinally in the year following a birth. We hypothesized that poverty and exposure to domestic violence (contextual stressors), as well as discrimination and foreign-born status (cultural stressors) would be associated with higher depressive symptoms at 1-month postpartum, and that these associations would persist over time, at 6 and 12 months postpartum. Due to the conflicting findings with regard to the effects of language (English/Spanish), and sparse findings on age of immigration in the context of postpartum depression, analyses on these variables were exploratory.

Method

The present study utilized data collected in 2003–2008 by the Community Child Health Network (CCHN), a multisite community-based participatory research collaboration with sites in Los Angeles, Chicago, Washington, DC, Baltimore, and eastern North Carolina (Ramey et al., 2015). CCHN study aims were to measure stress and resilience in mothers after birth to predict postpartum allostatic load and address maternal and child health disparities. Study eligibility criteria were that mothers (a) self-identify as African American, Hispanic, or non-Hispanic White (b) be between 18 and 40 years of age; (c) be willing to complete interviews in either English or Spanish; (d) be residents in one of the identified communities for at least 6 months; (e) have 4 or fewer children including the new infant; and, (f) not have plans to be surgically sterilized following birth. Interested mothers were provided with study information, and informed consent was obtained for those who agreed to participate. Trained bilingual interviewers conducted face-to-face interviews in women's homes at three time points: approximately 1-month postpartum (T1), 6-months postpartum (T2), and 12-months postpartum (T3). Interviews included multiple measures of stress and resilience, physical and mental health, and sociodemographic information. The study protocol was approved by the institutional review board of each participating site.

Participants

In the present study, the sample consists of 537 mothers with complete data out of 607 total Latinas in the CCHN maternal cohort; 1,349 African American and 554 White women from the larger sample are excluded. Women in this sample lived primarily in Chicago (47%) and Los Angeles (30%) and were disproportionately very low-income with 42% of women reporting a household income at or below the federal poverty line and a mean per capita household income (adjusted for cost of living in study sites) of \$9,750.66 ($SD = 13,306.84$). A majority of the study sample was foreign born (71%), most were of Mexican descent (68%) and nearly 60% preferred to speak Spanish during the interviews. For additional demographic characteristics of the sample, see Table 1.

Measures

Poverty. The first interview included questions on household income and number of people living in the household. CCHN calculated three poverty categories based on the U.S. Census Bureau, Weighted Average Poverty Thresholds, 2009 (U.S. Census Bureau, 2009), which vary according to the size of the household: (a) $\leq 100\%$ federal poverty level (FPL; indicating income at or less than poverty threshold); (b) 101–200% FPL (indicating near poverty); and (c) $>200\%$ FPL (indicating no poverty). Two dummy codes were used to represent the three groups, where $\leq 100\%$ FPL, or poverty, was the reference group.

Domestic violence. Domestic violence was measured using a modified version of Hurt, Insulted, Threatened with Harm and Screamed (HITS), a standard screen for domestic violence that was

administered to mothers at T1 (Sherin, Sinacore, Li, Zitter, & Shakil, 1998). The HITS includes four items related to physical hurt, insult, threats, and screaming toward self or others in the household and we included an additional item regarding domination or emotional control (O'Campo, Caughy, & Nettles, 2010). Mothers were asked whether they had encountered any violence item in the last year and specified whether the perpetrator was a "partner or spouse", "another family member" or "someone else in your household". Mothers responded using a 5-point frequency format (1 = *never* to 5 = *frequently*), with responses summed for a total score from 5 to 25. This scale has demonstrated acceptable internal and concurrent validity, good sensitivity and specificity (Rabin, Jennings, Campbell, & Bair-Merritt, 2009), and its use has been validated with Spanish speaking Latinas (Chen, Rovi, Vega, Jacobs, & Johnson, 2005).

Discrimination. Discrimination was measured using the Everyday Discrimination Scale (Williams, 1997) administered at T1 which is composed of 10 items that assess the general frequency of chronic and routine experiences of unfair treatment in an individual's day-to-day life. All items are scored on a six-point scale ranging from 0 = *never* to 5 = *almost every day*, such that higher scores indicate more frequent discrimination. For each discriminatory incident probed, women were able to attribute the experienced discrimination to one or more of the following reasons: (a) ancestry or national origins, (b) gender, (c) ethnicity/race, (d) shade of skin color, (e) language or accent, (f) sexual orientation, (g) age, or (h) height or weight. This scale has been validated in English and Spanish (Krieger, Smith, Naishadham, Hartman, & Barbeau, 2005), and has been used in community samples of immigrant Latinx (Cobb, Xie, Meca, & Schwartz, 2017). Cronbach's alpha coefficients in this sample were $\alpha = .86$ for Spanish speakers and $\alpha = .89$ for English speakers. Because Everyday Discrimination scores were positively skewed, a log transformation was conducted which resulted in a normal distribution.

Cultural demographic variables. All cultural demographic variables were assessed at T1. English versus Spanish language preference was determined based on the language that participants chose for the study interviews and was dummy coded (reference group = English language preference). Dummy variables were also created for U.S. versus foreign birth (reference group = U.S. birth). Participants reported the age at which they immigrated to the United States (if applicable). Age of immigration was divided into women who immigrated at age 7 or below (early arrival; Alegría, Sribney, Woo, Torres, & Guarnaccia, 2007), and those who immigrated after 7 years of age. Two dummy codes were used to represent U.S. born Latinas (vs. early arrival; reference group) and those who immigrated before versus after age 7 (reference group = early arrival).

Covariates. We included factors previously associated with postpartum depression in order to better determine the unique effect of the cultural and contextual stress variables on postpartum depressive symptoms. Three variables were identified as reliably linked to postpartum depression—negative life events (Boyd, Zayas, & McKee, 2006), marital status (Beck, 2001), and maternal education (Vliegen, Casalin, & Luyten, 2014). All covariates were measured at T1. The life events checklist was adapted by removing items inquiring about discrimination and domestic violence assessed by other multiitem measures and assessed whether a series of 24 stressful events (e.g., death of a loved one) occurred in the

Table 1
Sample Characteristics ($n = 537$)

| Sociodemographic variables | Mean (SD) or n (%) | Range |
|------------------------------------|-----------------------------|-----------|
| Age | 25.70 (5.25) | 18–40 |
| Number of prior births | | 0–4 |
| 0 (studied following first birth) | 216 (40.2) | |
| 1 (studied following second birth) | 218 (40.6) | |
| 2 (studied following third birth) | 99 (18.4) | |
| Nativity | | |
| U.S. born | 155 (28.9) | |
| Foreign born* | 382 (71.1) | |
| Spanish language preference | 318 (59.2) | |
| English language preference | 219 (40.8) | |
| Per capita household income | 9,750.66 (13,306.84) | 0–133,330 |
| Federal poverty level (FPL) | | |
| $<100\%$ FPL | 226 (42.1) | |
| $>100\%$ FPL | 220 (40.9) | |
| $>200\%$ FPL | 91 (17.0) | |
| Married to baby's father at T1 | 210 (39.1) | |
| Site | | |
| Los Angeles | 162 (30.2) | |
| Chicago | 284 (47.3) | |
| North Carolina | 4 (.6) | |
| Washington, D.C. | 88 (16.4) | |
| Education | | |
| Less than high school | 191 (35.6) | |
| Some college, no 4-year degree | 240 (44.6) | |
| College courses or college degree | 99 (18.4) | |

* Foreign born mothers where primarily from Mexico (67.8%) and El Salvador (11.0%).

year prior to the birth of the child. Adaptations were consistent with its use in prior studies (Dominguez, Schetter, Mancuso, Rini, & Hobel, 2005; Tanner Stapleton et al., 2016) which along with others show predictive validity for depression in the perinatal period (Falah-Hassani, Shiri, & Dennis, 2016). Any endorsed event was summed into a Life Events Count score. Women were also asked if they were married to the baby's father (reference group = unmarried) and to report on their educational attainment. For our analyses, women who pursued schooling beyond a high school degree were compared to a reference group who did not obtain additional schooling after high school or did not receive a high school degree.

Depressive symptoms. The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) was administered at all three time points following birth. The EPDS is a measure used to screen individuals at risk for perinatal depression and it is validated in both English (e.g., Murray & Carothers, 1990) and Spanish (Alvarado, Jadresic, Guajardo, & Rojas, 2015; Garcia-Esteve, Ascaso, Ojuel, & Navarro, 2003). Further, the EPDS demonstrates cross ethnic/racial measurement equivalence (Di Florio et al., 2017). It is comprised of 10 items that assess the severity of common depressive symptoms experienced in the previous 7 days. All questions are scored on a Likert scale from 0 ("not at all") to 3 ("almost always/most of the time"), with higher scores indicating more depressive symptoms. Though analyses were conducted on the continuous measure, for descriptive purposes, women were categorized as having possible depression with EPDS scores between 10 and 12, and probable depression with scores >12. Cronbach's alpha coefficients for the scale across the three time points ranged from .79 to .83 for Spanish speakers and from .80 to .87 for English speakers.

Data Analysis Plan

Nested multilevel growth models were used to examine the effect of cultural stress (i.e., discrimination, language preference, foreign-born status, and age of immigration) over and above contextual stress (i.e., poverty and domestic violence) on the longitudinal growth trajectory of postpartum depressive symptoms. To handle missing data (29% attrition T2, and 22% at T3), models were estimated by a full information maximum likelihood (FIML), which provides unbiased parameter estimates and standard errors, particularly useful for longitudinal designs with data missing at random (Ferro, 2014). FIML was considered an appropriate way to handle missing data, as comparisons between the means of all variables included in the model did not differ systematically between participants who missed study visits versus those that did not. All analyses were conducted in HLM 7.03 (Raudenbush, Bryk, & Congdon, 2017).

The first step of the analysis was to determine the functional form of the trajectory of PPD symptoms over three time points, that is, one, six, and 12 months after birth. This was done by fitting two unconditional models, a linear and quadratic time model. If the quadratic term in the latter model was significant, that model would be used for the second step of the analysis; otherwise, the linear time model would be used. For both models, time was coded as a discrete variable, such that T1 was coded as zero, T2 as one, and T3 as two.

The second step of the analysis was to determine the best fitting model. To do this, three nested models were specified. The initial model was a covariates-only model that included negative life events, maternal education, and marital status at Level 2. The contextual stressors model added poverty and domestic violence variables to the model at Level 2. The final model, the combined stressors model, included all terms in the previous model and added cultural stress variables: discrimination, foreign-born status, early immigration, and language preference to Level 2. The multilevel equations for the linear time form of the final model were as follows, for each individual i at each time point t :

$$PPD_{ti} = \pi_{0i} + \pi_{1i} \times \text{Time}_{ti} + e_{ti}$$

$$\begin{aligned} \pi_{0i} = & \beta_{00} + \beta_{01} \times \text{Marital Status}_i + \beta_{02} \times \text{Maternal Education}_i \\ & + \beta_{03} \times \text{Negative Life Events}_i + \beta_{04} \times \text{Near Poor}_i \\ & + \beta_{05} \times \text{Not Poor}_i + \beta_{06} \times \text{Domestic Violence}_i \\ & + \beta_{07} \times \text{Foreign Born}_i + \beta_{08} \times \text{Language}_i \\ & + \beta_{09} \times \text{Late vs Early Immigration}_i \\ & + \beta_{010} \times \text{US vs Early Immigration}_i + \beta_{011} \text{Discrimination}_i \\ & + r_{0i} \\ \pi_{1i} = & \beta_{10} + \beta_{11} \times \text{Marital Status}_i + \beta_{12} \times \text{Maternal Education}_i \\ & + \beta_{13} \times \text{Negative Life Events}_i + \beta_{14} \times \text{Near Poor}_i \\ & + \beta_{15} \times \text{Not Poor}_i + \beta_{16} \times \text{Domestic Violence}_i \\ & + \beta_{17} \times \text{Foreign Born}_i + \beta_{18} \times \text{Language}_i \\ & + \beta_{19} \times \text{Late vs Early Immigration}_i \\ & + \beta_{010} \times \text{US vs Early Immigration}_i \\ & + \beta_{110} \times \text{Discrimination}_i + r_{0i} \end{aligned}$$

Continuous variables (everyday discrimination, negative life events, exposure to domestic violence) were centered around each overall mean (i.e., grand mean centering), and marital status, maternal education, poverty, foreign-born status, early immigration and language were dummy coded (reference groups described in methods section). Covariates and all study variables were included as predictors of the intercept (i.e., baseline depressive symptoms) and as predictors of the slope—which tested the interactions between predictors and time on our outcome (i.e., change in depressive symptoms over time). The intercept and the slopes were allowed to vary randomly, and models were estimated using full maximum likelihood. The differences between these models were tested using likelihood ratio tests. We hypothesized that the model that included both contextual and cultural stressors would be the best overall model. The third step of the analysis was to examine the significance of the predictors individually in the best-fitting or final model.

Results

Descriptive Statistics on Depression and Discrimination

The mean scores on the EPDS at one, six and 12 months after birth were 4.81 ($SD = 4.47$), 5.20 ($SD = 4.34$) and 5.47 ($SD =$

4.38). At one month, 8.7% of EPDS scores were in the range of possible depression (scores between 10 and 12), while 7.1% were in the range of probable depression (scores >12). At six months, percentages went up to 9.0% and 9.3% respectively, and at 1-year post birth, 9.9% of women met criteria for possible depression and an additional 9.6% for probable depression. More than two thirds of the women reported experiencing discrimination at least “a few times a year” (68%), whereas nearly one third (32%) reported experiencing discrimination less than “once a year” or “not at all.” The most frequently endorsed experiences of discrimination were: “People act as if they are better than you”; “You are treated with less respect than other people” and “People act as if you are not smart”. Women’s attributions for their discriminatory experiences are found in Table 2.

Bivariate Correlations and Mean Differences of Study Variables

Bivariate correlations revealed that depressive symptoms at all time points were positively associated with everyday discrimination at T1 (all p values > .05) and with domestic violence at T1 (all p values > .05). Correlations between the remaining variables of interest, can be found in Table 3. On average, scores on domestic violence and discrimination were low (domestic violence: $M = 6.27$; discrimination: $M = 8.93$), though they ranged widely (domestic violence: $SD = 2.43$; discrimination: $SD = 7.12$). Independent samples t tests revealed no mean differences in depressive symptoms at any time point based on language preference, foreign-born status and early immigration to the United States. However, English language preference and U.S. birth were associated with higher mean scores on both everyday discrimination (language: $t(604) = 4.04, p < .001$; nativity: $t(604) = 4.16, p < .001$), and domestic violence (language: $t(538) = 1.97, p = .049$; nativity: $t(604) = 2.17, p = .031$).

Examining Contextual and Cultural Pathways to PPD Symptoms Over Time

Regarding the form of the PPD trajectory over time, the fixed quadratic effect was not significant. Thus, time was incorporated as a linear effect ($p < .05$) in all succeeding models. The first likelihood ratio test, comparing the covariates-only and the con-

textual stress models, showed that the inclusion domestic violence and poverty into the model significantly improved model fit ($\chi^2(6) = 53.12, p < .001$) compared to a model with covariates only. The second likelihood ratio test, comparing contextual stress and combined stress models, showed that the inclusion of cultural stress variables (discrimination, foreign-born status, language preference, and age of immigration) significantly improved model fit ($\chi^2(8) = 32.54, p < .001$) compared to a model with just contextual stressors and covariates.

In the final and best fitting model, domestic violence ($\beta = .39, SE = .09, p < .001, 95\% CI [.22, .57]$) and discrimination ($\beta = .13, SE = .02, p < .001, 95\% CI [.09, .18]$) were each associated with higher depressive symptoms at one month postpartum, over and above marital status, maternal education and negative life events. Language preference, foreign born status, and early immigration to the United States were not significant predictors of EPDS symptoms at one month postpartum (all p values > .05). None of the interactions between time and contextual stressors, or cultural stressors were significant (all p values > 0.5), indicating that these stressors did not change the linear slope of depressive symptoms over the year. Only negative life events, a covariate, interacted significantly with time ($\beta = -.05, SE = .02, p = .003, 95\% CI [-.08, -.02]$), indicating that mothers who endorsed more negative life events than average showed linear decreases in EPDS scores over the year postpartum compared to those endorsing fewer negative life events than average. To see all fixed effects, random effects and variance components for each nested model, see Table 4.

Discussion

This study was based on a conceptual model of postpartum depression specific to Latinas living in the United States (Lara-Cinisomo et al., 2016). To our knowledge, this is the first study to simultaneously test cultural and contextual stressors together as predictors of depressive symptoms in Latinas following the birth of a child and over one year postpartum. We found that those who experienced higher levels of discrimination and domestic violence had more depressive symptoms at 1-month postpartum controlling for several well-known risk factors. Yet neither discrimination nor domestic violence was associated with the linear trajectory of depressive symptoms over the year postpartum, suggesting that in this community sample, these stressors are associated with higher baseline symptomology but not with changes in symptomology from one to six, and six to 12 months postpartum.

In this sample, about 16% of women had possible or probable depression at one month postpartum, 18% at six months, and 19.5% at one year. Other prevalence studies of depression in community samples of Latinas in the immediate postpartum (e.g., 1–6 weeks) report rates ranging from 27% using the EPDS (Malek, Connolly, & Knaus, 2001) as in the present study, to 40% in a largely undocumented sample using the Center for Epidemiologic Studies Depression Scale (Kuo et al., 2004). Thus, the present findings are in the lower range of those estimates. Nonetheless, the fact that 1 in 5 women have notable symptoms of depression at one year is concerning, and study findings underscore the persistence of symptoms over the year in a community sample.

Table 2
Attribution of Everyday Discrimination Experiences ($n = 413$)

| Attribution | Frequency | Percent (%) |
|-----------------------------|-----------|-------------|
| Race or ethnicity | 204 | 49.4 |
| Language or accent | 184 | 44.6 |
| Ancestry or national origin | 127 | 30.8 |
| Age | 97 | 23.5 |
| Gender | 91 | 22.0 |
| Shade of skin or skin color | 89 | 21.5 |
| Height or weight | 50 | 12.1 |
| Missing | 9 | 2.2 |
| Sexual orientation | 8 | 1.9 |

Note. Participants were able to make more than one attribution of discrimination, as such, the percentages do not add up to 100. The mean number of attributions made by participants was about 2 ($M = 2.08, SD = 1.55$).

Table 3
Correlations Between Variables Under Study for the Complete Sample

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--|--------|--------|--------|---------|--------|---------|--------|--------|---|
| 1. PPD symptoms T1 | 1 | | | | | | | | |
| 2. PPD symptoms T2 | .474** | 1 | | | | | | | |
| 3. PPD symptoms T3 | .450** | .610** | 1 | | | | | | |
| 4. Everyday discrimination | .358** | .226** | .200** | 1 | | | | | |
| 5. Foreign born | .014 | -.026 | .023 | -.017* | 1 | | | | |
| 6. Language preference (English vs. Spanish) | -.002 | -.041 | -.011 | -.080* | .598** | 1 | | | |
| 7. Poverty category | -.058 | -.077 | -.005 | -.068 | -.014 | -.190** | 1 | | |
| 8. Domestic violence | .372** | .263** | .247** | .373** | -.093* | -.085* | -.089* | 1 | |
| 9. Early arrival to U.S. | .097 | .012 | .070 | -.180** | .915** | .685** | -.049 | -.101* | 1 |

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

Our study is among the first to explore the association between discrimination and postpartum depressive symptoms in Latinas with the exception of one study that had some Latinas in a mixed sample (Surkan et al., 2006). Women who endorsed greater than average experiences of everyday discrimination reported more depressive symptoms one month postpartum. These Latinas indicated that their ethnicity, language or accent, or ancestry/national origin were the bases of reported discrimination. Although evi-

dence increasingly demonstrates significant associations between racial discrimination and postpartum depression in African American women (Ertel et al., 2012; Heldreth et al., 2016), this phenomenon has rarely been examined in Latinas. Our findings point to the relevance of discrimination for the mental health of Latina mothers. Of note, these data were collected between 2003 and 2008, and discrimination against the Latinx community is higher now. Irrespective of political party, U.S. citizens perceive an

Table 4
Fixed and Random Effects With Robust Standard Errors for the Growth Models of Postpartum Depressive Symptoms ($n = 537$)

| Variable | Model 1 (Covariates) | | Model 2 (Cultural stressors + Covariates) | | Model 3 (Contextual stressors + Cultural stressors + Covariates) | |
|-----------------------------|-------------------------|---------------------|--|---------------------|--|---------------------|
| | β (SE) | 95% CI [LL, UL] | β (SE) | 95% CI [LL, UL] | β (SE) | 95% CI [LL, UL] |
| Intercept predictors | | | | | | |
| Intercept | 5.07 (.23) | [4.84, 5.30] | 5.27 (.29) | [4.71, 5.84] | 6.58 (1.62) | [3.40, 9.76] |
| Marital status | -.47 (.35) | [-1.16, .22] | -.38 (.35) | [-1.07, .30] | -.67 (.34) | [-1.35, 0] |
| Maternal education | .03 (.42) | [-.79, .85] | .24 (.46) | [-.66, 1.13] | .32 (.45) | [-.57, 1.21] |
| Negative life events | .21 (.03) | [.15, .27] | .16 (.03) | [.11, .22] | .14 (.03) | [.08, .19] |
| Near poverty | | | -.56 (.36) | [-1.27, .14] | -.49 (.35) | [-1.39, .41] |
| Not poor | | | -.22 (.55) | [-1.31, .86] | .24 (.55) | [-.85, 1.33] |
| Domestic violence | | | .49 (.09) | [.32, .66] | .39 (.09) | [.22, .57] |
| Foreign born | | | | | -1.26 (1.56) | [-4.31, 1.79] |
| Language | | | | | .60 (.48) | [-.35, 1.55] |
| Late v. early immigration | | | | | -.21 (.74) | [-1.65, 1.23] |
| U.S. v. early immigration | | | | | -2.15 (1.64) | [-5.37, 1.06] |
| Discrimination | | | | | .13 (.02) | [.09, .18] |
| Slope predictors | | | | | | |
| Intercept | .38 (.16) | [.07, .69] | .27 (.21) | [-.14, .67] | .22 (1.49) | [-2.71, 3.15] |
| Marital status | .19 (.23) | [-.26, .64] | .17 (.23) | [-.29, .63] | .27 (.23) | [-.18, .72] |
| Maternal education | -.58 (.27) | [-1.11, -.05] | -.58 (.33) | [-1.23, .07] | -.61 (.32) | [-1.24, .01] |
| Negative life events | -.06 (.02) | [-.10, -.02] | -.05 (.02) | [-.03, -.08] | -.05 (.02) | [-.08, -.02] |
| Near poverty | | | .24 (.25) | [-.24, .74] | .25 (.25) | [-.25, .75] |
| Not poor | | | .11 (.41) | [-.71, .93] | -.02 (.42) | [-.85, .81] |
| Domestic violence | | | -.04 (.05) | [-.14, .06] | -.01 (.05) | [-.12, .09] |
| Foreign born | | | | | -.13 (1.4) | [-2.96, 2.70] |
| Language | | | | | -.14 (.32) | [-.78, .49] |
| Late v. early immigration | | | | | .17 (.48) | [-.78, 1.12] |
| U.S. v. early immigration | | | | | .37 (1.49) | [-2.54, 3.29] |
| Discrimination | | | | | -.03 (.02) | [-.08, .00] |
| Variance components | | | | | | |
| Intercept (τ_{00}) | 8.37 | | 6.90 | | 6.03 | |
| Time slope (τ_{11}) | 1.05 | | .99 | | .97 | |
| L1 residual (σ^2) | 8.52 | | 8.51 | | 8.48 | |
| Deviance | 6869.93 | | 6797.72 | | 6763.59 | |

Note. Bold coefficients and variance components are significant at $p < .05$.

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increase in discrimination against Latinx since the last presidential election (Pew Research Center, 2019). Thus, future studies of perinatal health in Latinas should measure discrimination to determine rates in pregnancy and impact on birth and postpartum outcomes.

The finding that domestic violence experienced during pregnancy and early postpartum is associated with higher levels of postpartum depressive symptoms is consistent with prior research. Our measure of domestic violence included violence by an intimate partner, which has been identified as a risk factor of particular importance for postpartum depression in Latinas (Blackmore & Chaudron, 2014; Rodríguez et al., 2010). We expand upon past findings on violence during pregnancy and postpartum depressive symptoms by measuring violence perpetrated by anyone in the household. In our sample, about 45% of these Latinas reported experiencing violence in the home, and of those, three-quarters were reported to be by an intimate partner and one fourth by someone other than an intimate partner. These rates are well within the range of prevalence rates (4%-80%) of interpersonal violence calculated for Latinas in a recent systematic review (Gonzalez, Benuto, & Casas, 2018). Women who experience violence at the hands of nonintimate partners are at increased risk of also experiencing violence at the hands of intimate partners (Krebs, Breiding, Browne, & Warner, 2011), making this group of women particularly vulnerable to adverse mental health sequelae including depression and anxiety (Pico-Alfonso et al., 2006). Though not measured in our study, Latinas are more likely than women in other ethnic groups to live with extended family members during the perinatal period (Tamis-Lemonda & Kahana-Kalman, 2009). Future work should consider the effects of exposure to violence both in and beyond the context of an intimate relationship.

Contrary to our hypotheses, foreign-born status and poverty were not associated with trajectories of postpartum depressive symptoms. Regarding foreign-born status, previous studies that find no association between Latina women's country of origin and postpartum depression (Chaudron et al., 2005; Kuo et al., 2004) suggest that it is financial hardship that accounts for elevated risk in immigrant women (Rich-Edwards et al., 2006). In our sample, poverty was not significantly associated with depressive symptoms and virtually all the women in the sample were very low income (92.1% making \$25,000 or less/year). Thus, we likely had insufficient variability to replicate effects found in samples with a wider distribution on socioeconomic status (Goyal, Gay, & Lee, 2010; O'Hara & McCabe, 2013).

In addition, we found that mothers who endorsed more negative life events than average in the year preceding the birth of their baby showed linear decreases in symptoms over the year postpartum. This finding was unexpected, as previous studies have reported that a greater number of prenatal life events are associated with postpartum depressive symptoms in Latinas (e.g., Boyd et al., 2006; Luecken, Crnic, Gonzales, Winstone, & Somers, 2019). However, some evidence suggests that negative life events only lead to clinically significant depressive symptoms in women who endorse prior depression (Marks, Wieck, Checkley, & Kumar, 1991). This may point to biased cognitive processing of negative life events (e.g., difficulties disengaging from negative memories), and not the *number* of events as the underlying mechanism that links life events and depression (Gotlib & Joormann, 2010). The timing of the negative life events may also be a factor. At 1-month

postpartum, women who reported an above average number of negative life events in the last year had more depressive symptoms, when events (e.g., a robbery, the death of a loved one) were most proximal. This is consistent with evidence that acute negative life events have their greatest impact on depressive symptoms in the short term (Brown & Rosellini, 2011), and that their effect reduces over time (e.g., Howe, Hornberger, Weihs, Moreno, & Neiderhiser, 2012).

Regarding limitations, although we adjusted for several variables previously associated with postpartum depression, we could not control for preexisting anxiety or depressive symptoms. Given the associations between prenatal and postnatal psychopathology (Milgrom et al., 2008), controlling for depressive symptomology during pregnancy in future studies can refine the estimate of the relative impact of cultural and contextual stressors on depressive symptoms during this important time in women's lives. Though we examined most variables in Lara-Cinisomo and colleagues (2016) model, we were not able to examine acculturative stress or border crossing trauma, as these variables were not assessed as part of the original study. Study variables that were included, such as discrimination, nativity and language preference, are likely to be associated with acculturative stress, since Latinx individuals who are foreign-born, prefer to speak Spanish, and report discrimination also score higher on measures of acculturative stress (Araújo Dawson & Panchanadeswaran, 2010; Bravo, Umaña-Taylor, Toomey, Updegraff, & Jahromi, 2016; Castillo et al., 2015; Torres, Driscoll, & Voell, 2012). Nonetheless, the aforementioned cultural stressors warrant future study, especially in longitudinal contexts.

While we intentionally limited our analyses to psychosocial factors, future work should examine biological mediators (i.e., markers of dysregulated HPA axis and oxytocin) to better understand perinatal physiological dysregulation and its mental health sequelae in Latinas. It should also be noted that women in this sample were primarily of Mexican descent, and these findings may not be generalizable to women from other places of origin such as Cuba, South or Central America. Nationally representative data from Latinx adults have shown differences in English language proficiency, migration experiences and family conflict based on an individual's county of origin—all important correlates of mental health outcomes (Guarnaccia et al., 2007). It is possible then, that the cultural and contextual risks we studied may occur at different rates or have differential effects on the postpartum mental health of Latinas of other origins residing in the United States.

In sum, we examined conceptually driven predictors of cultural and contextual stress in a sample of low-income U.S. and foreign-born Latinas. We identified discrimination and domestic violence as stressors that predicted symptom trajectories. Women who reported greater than average experiences of discrimination and domestic violence started with higher levels of depressive symptoms at one month postpartum. The lack of linear change in depressive symptoms associated with these stressors demonstrated that the impact of above average levels of discrimination and domestic violence persisted across the year. However, given that these cultural and contextual stressors were concurrently associated with depressive symptoms, we must consider the possibility of a bidirectional relationship between the stressors and depression. For example, in line with the integrative interpersonal frameworks for depression (Hames, Hagan, & Joiner, 2013), it is possible that women with higher baseline depressive symptoms hold

core beliefs about rejection that make them more likely to perceive discrimination. It is also known that depression and interpersonal conflict are dynamic and intercorrelated (Coyne, 1976). Still, these longitudinal findings add to a conceptual model of risk for postpartum depression for Latinas living in the United States by demonstrating that stressors particular to Latinas' ethnic experience are important over and above contextual stressors that Latinas experience at disproportionate rates but are not culturally specific.

The extensive contact with health care systems during pregnancy provides a window of opportunity to employ brief interventions for women encountering violence in the home (World Health Organization, 2015). Depression interventions during the perinatal period with components to address domestic violence have had limited success (Jahanfar, Howard, & Medley, 2014), but their effectiveness and design warrant continued investigation given the high rate of domestic violence in our sample. Further, our findings support the inclusion of discrimination as a treatment target for precision cultural tailoring. This is a focused approach to intervention adaptation that identifies ways in which cultural variables (e.g., immigration related stressors) may be assessed at the individual level to activate intervention components to improve treatment fit. Though clinicians cannot intervene directly on discriminatory experiences, they can utilize various cognitive and acceptance based coping strategies as well as explore their client's ethnic identity as a way of reducing the effects of this cultural stressor on depression in the postpartum period. For example, active coping strategies for responding to personal discrimination (e.g., confrontation, seeking social support) are theorized to moderate the link between discrimination and heightened physiological stress responses, and in turn improve effects on mental health outcomes (Pascoe & Smart Richman, 2009). Thus, including content about coping with discrimination within interventions for postpartum depression may increase their effectiveness for ethnoracial minority women.

The field remains disproportionately focused on pathways of risk for postpartum depression in Latinas. Continued identification of factors that mitigate cultural and contextual risk to inform intervention work (Heilemann et al., 2004) during pregnancy when addressing stressors may prevent postpartum depression. Moreover, Latinas remain an understudied group in research on perinatal mood disorders with limited evidence-based treatments tested for use in this population (Zayas & Sampson, 2014), and few interventions available in Spanish (Lara-Cinisomo & Wisner, 2014), making translational research on cultural and contextual risk and resilience a priority. Findings from this study set the stage for future translational work examining both cultural and contextual determinants of postpartum mental health in Latinas, who remain an underserved group.

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