Midwifery 64 (2018) 63–68

Contents lists available at ScienceDirect

Midwifery

journal homepage: www.elsevier.com/locate/midw

Lack of partner impacts newborn health through maternal depression: A pilot study of low-income immigrant Latina women

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ARTICLE INFO

Keywords:
Depression
Infant health
Latinos
Life history theory
Planned pregnancy
Relationship status

ABSTRACT

Introduction: Latina women have a high burden of depression and other mental health issues, particularly in the perinatal period. Suboptimal maternal mental health can have adverse developmental and physiological impacts on child growth. The present study examines the impact of unplanned pregnancy and pregnancy relationship status on prenatal maternal depression in a sample of low-income Latina women. We hypothesized that the association between these prenatal stressors and newborn health would be mediated through prenatal depression.
Method: The present study included a sample 201 Latina mothers and their children recruited from prenatal clinics during their second or third trimesters. Depression symptomology, relationship status were collected prenatally. At birth, several indices of newborn health were examined, including head circumference percentile and birthweight. Finally, planned pregnancy status was retrospectively collected when the child was between 1 and 2 years old.
Results: Structural equation modelling revealed that single women, compared to partnered women, had higher levels of depression. Higher levels of depression, in turn, predicted poorer newborn health. Unplanned pregnancy was not significantly associated with newborn health.
Discussion: These results suggest that relationship status may be an important screening question for medical examiners to ask to pregnant Latina women during prenatal visits. These results are consistent with past research investigating the effects of maternal mental health on adverse birth outcomes that propose that stressful early environments shape developmental trajectories.

Introduction

Pregnancy can engender intense physical and emotional upheavals in women. Psychosocial and cultural factors may not only exacerbate or diminish pregnancy-related stressors (Dunkel Schetter, 2011), but may buffer their effects on pregnancy outcomes. Evolutionary perspectives (Ellis, 2004; Hrdy, 2000) suggest that instrumental and social support from one's partner and family are of importance and can impact child health and development (Ellis, 2004; Flinn, 2006). The intense physiological and temporal burden of pregnancy orients women to be selective of *when* and with *whom* they have a child (Ellison, 2003; Trivers, 1972). Medical anthropological frameworks similarly emphasize the role men play as mates and fathers in matters of maternal and infant health (Dudgeon and Inhorn, 2004). Succinctly put, the *men as partners* framework posits that men, directly and indirectly, help shape the health of women and infants during pregnancy (Dudgeon and Inhorn, 2004).

The impact of partner presence (i.e., maternal relationship status) and maternal relationship health on physical development, interpreted through an evolutionary perspective, has been mainly focused on physical health and development in adolescence (Ellis et al., 1999; Ellis and Garber, 2000). For instance, both maternal mental health and partner absence was implicated in early pubertal development in girls. As such, we argue that the effects of father presence (i.e., maternal relationship status), may have a similar effect on physical health in newborns, through maternal mental health.

Maternal mental health and the presence of prenatal stressors are critical in shaping newborn health (Diego et al., 2006; Dole, 2003; Grote et al., 2010). Depression may play an especially important role for Latina women given findings that the prevalence of depression among preg-

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https://doi.org/10.1016/j.midw.2018.05.014
Received 31 October 2017; Received in revised form 23 April 2018; Accepted 30 May 2018

nant Latinas is at 32.4% (Lara et al., 2009). Additionally, current theoretical conceptualizations propose that maternal mental health during pregnancy may communicate or convey contextual information to the developing child regarding the quality of the psychosocial environment (Del Giudice, 2012; Dunkel Schetter and Tanner, 2012). The quality or supportiveness of the psychosocial context (conveyed through maternal mental health) should impact infant well-being.

For this reason, we investigate in a sample of Latina women two prenatal stressors that capture the condition of the mother's environment and indicate whether her social support and material resources are sufficient. The current study investigates the effects of two common stressors on prenatal depression – maternal relationship status and planned pregnancy status – and the impact of depression on newborn health in a sample of low-income Latina women. Both single motherhood and an unwanted or unplanned pregnancy have been linked to neonatal mortality and poorer maternal and child health (Angel and Worobey, 1988; Berkman et al., 2015; Gaudino et al., 1999). Infants without a reported father on their birth certificate were at increased risk for infant mortality, when controlling for other risk factors (Gaudino et al., 1999). We hypothesized that

1. Single women and women reporting an unplanned pregnancy will report greater depression than women in relationships or women reporting planned pregnancies,
2. Greater maternal depression will predict poorer newborn health,
3. Maternal depression will mediate the relationship between maternal relationship status and unplanned pregnancies with newborn health.

Method

Participants

Two-hundred and one mothers and their newborns (50% female) participated in the current study. The mothers were all Latina (37.32% South/Central American; 61.19% Mexican; 1.00% Puerto Rican, and 0.50% other) with a mean age of 34.6 (SD = 5.10; range = 25–55). Maternal marital status prior to the birth of their child was as follows: cohabiting, 52.79%; married, 31.47%, divorced, 1.02%; single, 14.72%; 4 cases were missing). The majority of the mothers reported speaking primarily Spanish (93.5%; English, 6.5%), not having formal employment (71.64%; employed, 28.36%), being enrolled in the Women Infants and Children's program (WIC, 92.04%; no WIC, 7.96%) and having a high school education (77.55%; some college, 17.35%; College, 3.05%; Post-college, 2.04%). Most women in the sample were first time mothers (47.26; 1 child, 30.85%; 2 children, 15.42%; 3 children, 4.98%; 4 children, 1.0% 5 children, 0.50%). The majority of the women who answered whether the pregnancy was planned reported it as not being planned (57.06%; the pregnancy was planned, 42.94; 38 cases did not report this). The cohort (Hispanic, Eating and Nutrition cohort (HEN)) used in the present secondary data analysis has been previously described (Wojcicki et al., 2011a, 2011b).

Procedures

The study and its procedures were approved by the Committee on Human Research and the Institutional Review Board at University of California, San Francisco and San Francisco General Hospital (SFGH). Pregnant women who were in their second or third trimesters were recruited from prenatal clinics at UCSF and San Francisco General Hospital, California between May 2006 and May 2007. Written consent was obtained from all women in either Spanish or English. Women were ineligible to participate in the study if they: were abusing drugs/alcohol, had a history of diabetes or presently were experiencing gestational diabetes, suffered from polycystic ovarian syndrome, had an eating disorder or another health issue that could impact breast-feeding. If infants of the mother had special care needs or had an Apgar score below 7 at five minutes after delivery, the family was excluded from the study. Women were interviewed by trained research assistants. The research assistants were all fluent in Spanish, had university degrees and had received training from the committee on Human Research on human subjects protection training. See Wojcicki et al. (2011a), (2011b), for more information about the sample or procedure.

Missing Data Analysis. Missing data on the variables of interest ranged from 4 to 38 cases. Mothers with missing data did not significantly differ from those not missing data on total Center for Epidemiologic Studies Depression Scale score ($p = 0.4174$), and total Edinburgh Postnatal Depression Scale score ($p = 0.6275$). Mothers with more education ($r = 0.16$, $p < 0.03$) and English speakers ($r = 0.16$, $p < 0.02$) were more likely to have missing data. Planned pregnancy question was individually examined for missingness because it had the most missing data. Women with higher levels of education were more likely to not answer the planned pregnancy question ($r = 0.18$, $p < 0.01$). Missing cases were handled with robust maximum likelihood estimation.

Screening for covariates

Prior to computing Structural Equation Models, we examined possible maternal and sociodemographic confounders that may impact infant health. We ran multiple regression models of covariates predicting components of newborn health and included relationship status and planned pregnancy status (see Supplemental Table S1). The models predicting birth weight, F (11, 127) = 0.92, $p = 0.52$, and head circumference, F (11, 120) = 1.50, $p = 0.14$, were both non-significant. The covariate model predicting gestational age was significant, F (11, 124) = 1.86, $p = 0.05$. The only covariate that significantly predicted head circumference was maternal employment status at pregnancy. Women who reported being employed (yes = 1) had babies with younger gestational age ($\beta = -0.31$, $p < 0.001$). Based on these results, we included employment status (yes, employed/no, not employed) as a covariate in a sub-analysis of our model.

Measures

Maternal Relationship Status. Maternal prenatal relationship status was dichotomously coded to represent whether the mother was single (i.e., single or divorced) or in a relationship (i.e., married or cohabiting). Women who reported being single or divorced were coded as being single (0); women who reported being married or in a cohabiting relationship were coded as being in a relationship (1).

Planned Pregnancy. Planned pregnancy was a dichotomous one-item question ("*Had you planned beforehand to become pregnant at that time?*") asking mothers to report whether the pregnancy was planned ("*Yes, I had planned to become pregnant* "= 1) or not planned ("*No, I didn't plan to become pregnant*" = 0).The question was collected retrospectively, when the children were 12 months to 2 years.

Depression. Mother's level of prenatal depression was assessed utilizing two measures of depression: (1) Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), and (2) Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). The CES-D ($\alpha = 0.88$) consisted of twenty items scored on a 4-point scale from "Rarely or none of the time, < 1 day" (0) to "Most of the time, 5–7 days" (3). The EPDS ($\alpha = 0.80$) consisted of ten items scored on a 4-point scale, with appropriate items reversed-coded. Higher scores on each of the scales denoted higher levels of depression symptomology.

Newborn Health. Previous health research provided the justification for the aggregation of sets of variables. For instance, aggregated constructs that capture mental and physical health-enhancing factors, such as *slow life history in adulthood* (Figueredo et al., 2005), *ideal cardiovascular health* (Lloyd-Jones et al., 2010), and *multi-system resiliency* (Puterman and Epel, 2012), have been used as outcomes and predictors in prior models of health. Likewise, the creation of health-risking indices has also been used. The most notable example is the *allostatic load*, which

Table 1
Descriptive statistics and bivariate correlation of manifest variables.

	1	2	3	4	5	6	7
1. Relationship status	–						
2. Planned pregnancy	0.12	–					
3. CESD	**−0.17***	**−0.18***	–				
4. EPDS	**−0.15***	−0.12	**0.76****	–			
5. Gestational age	0.03	−0.10	−0.03	−0.08	–		
6. Birth weight[1]	0.08	−0.04	−0.08	**−0.15***	**0.41****	–	
7. Head circumference[1]	0.07	0.03	−0.11	**−0.17***	**0.27****	**0.49****	–
Mean or %	84.26%	42.94%	11.65	5.63	39.30	−0.17	34.20
Standard deviation	–	–	9.73	4.82	1.52	1.01	2.24

* $p < 0.05$; **$p < 0.01$. Significant correlations are bolded.
[1] Birth weight and head circumference Z-scores.

captures concerted dysregulation across various physiological systems (Seeman et al., 2009). As such, the creation of our latent factor for newborn health is informed by past research in pediatrics that find that birth weight and head circumference are early markers of chronic disease risk, such as cardiovascular disease (Barker et al., 1993). Tenets from life history theory (e.g., Flinn et al., 2011) also guided the selection of our items. Two items were selected: (1) birth weight and (2) head circumference, both transformed to Z-scores using growth curves provided by the Center for Disease Control (Grummer-Strawn et al., 2010). Greater birth weight and larger head circumference were indicative of better newborn health. Gestational age was used as a covariate of newborn health.

Statistical analyses

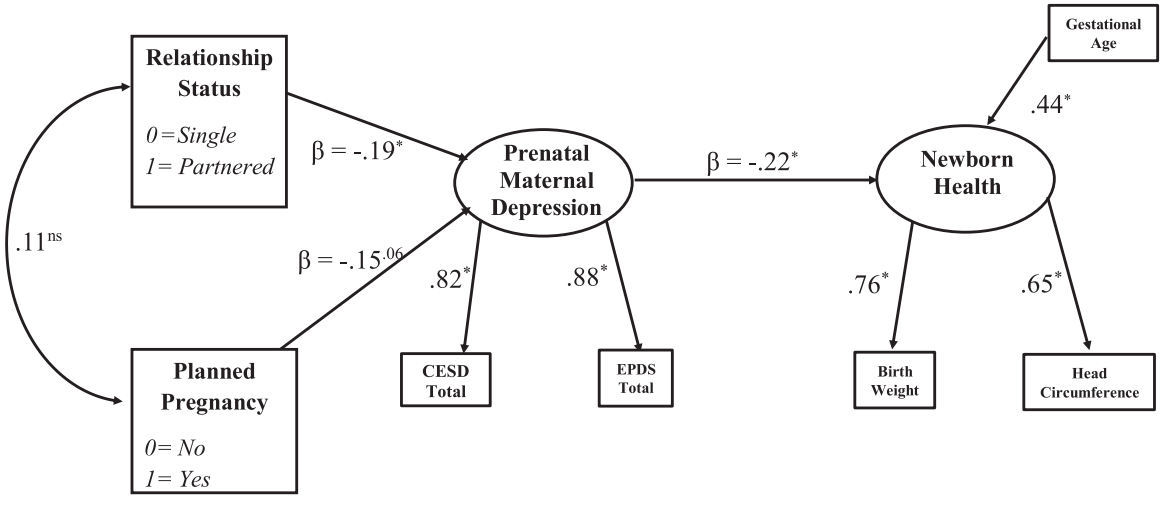
Structural equation modelling was performed in Mplus 6. Model fit was assessed by χ^2, Comparative Fit Index (CFI), and Root Squared Error of Approximation. Values > 0.95 signifies appropriate goodness-of-fit in CFI; values at ≤ 0.05 appropriate in RMSEA.

Results

Table 1 displays bivariate correlations for the indicator variables and Fig. 1 reports the findings of the structural equation model, including fit indices and standardized parameter estimates for the final model, all which were acceptable. As predicted, relationship status significantly predicted prenatal depression; partnered women reported lower levels of depression ($\beta = -0.19$, $p = 0.02$). Women whose pregnancies had been planned reported less depression prenatally, although the difference was of borderline significance ($\beta = -0.15$, $p = 0.06$). Also as predicted, increased depression predicted poorer newborn health ($\beta = -0.22$, $p = 0.01$). Neither relationship status nor planned pregnancy directly correlated with newborn health.

Sub-analysis Models. Based on the results of the multiple regression models previously described, maternal employment status was included to predict newborn health. Fit indices were good and factor loadings were appropriate, $\chi^2_{21} = 26.3084$, $p = 0.1949$; RMSEA = 0.0355; CFI = 0.9827; NFI = 0.9232. The pathway of planned pregnancy to depression was the same magnitude as before but missed significance ($\beta = -0.14$, $p = 0.07$). Relationship status to depression was also the same magnitude and significant ($\beta = -0.16$, $p < 0.03$). Both pathways leading to newborn health were non-significant with the inclusion of employment status (depression; $\beta = -0.14$, $p = 0.10$ and employment status; $\beta = -0.15$, $p = 0.07$).

A model was computed including direct pathways from planned pregnancy and relationship status to newborn health (with and without prenatal depression in the model). The pathways were non-significant. Finally, an SEM model that included an interactive term between rela-



$\chi^2_{10} = 8.560$, $p = .5743$; $RMSEA_{(.000, .068)} = .00$; CFI = 1.00; N = 201

Fig. 1. Structural equation model investigating the pathway from maternal stressors, prenatal depression, and newborn health, after robust maximum likelihood estimation, standardized estimates.

tionship status and planned pregnancy yielded a non-significant pathway to maternal depression ($\beta = 0.31$, $p = 0.16$).

Discussion

A process model was tested whereby prenatal stressors influenced newborn health via maternal prenatal depression in Latina mothers and their newborns ($N = 201$). Because previous research indicated that partner presence and access to resources may affect physical health and development in childhood and adolescence (Del Giudice et al., 2011; Ellis, 2004; Flinn, 2006), we tested a similar model on newborn physical health. We hypothesized that unplanned pregnancy status and the absence of an active partner would lead to higher levels of maternal depression in the mothers. Higher levels of prenatal maternal depression would predict poorer newborn health.

The structural equation model revealed that relationship status – the presence or absence of the mother's partner – significantly predicted maternal depression. In households where no partner was present, women reported higher levels of depression. However, relationship status was not independently associated with newborn health. The model additionally revealed a non-significant negative association between planned pregnancy and maternal depression (e.g., if the pregnancy was unplanned, the mothers reported higher levels of depression). Covariates were screened and maternal prenatal employment status included as a covariate. The model including a pathway between employment status to newborn health was non-significant. Inclusion of employment status in the model also produced a non-significant pathway between depression to newborn health. This suggests that women who are working may be experiencing additional stressors that are directly impacting the health of their children.

These results are of particular interest to midwives and doulas because it underscores the importance of social support on maternal mental health during the process and experience of pregnancy. Previous scholars have asserted that midwives play a significant role in identifying the quality of social support available to the pregnant women and also providing social support to mothers before and after pregnancy (Bogossian, 2007).

Quality of the psychosocial environment

Based on extant frameworks, indicators reflecting quality of the maternal psychosocial environment (Dudgeon and Inhorn, 2004; Dunkel Schetter and Tanner, 2012; Ellis, 2004) were highlighted as areas to consider when examining maternal stress during pregnancy: (1) presence of a partner during pregnancy and (2) planned pregnancy status. Both stressors may signify a deficit of psychosocial and/or instrumental support. Culture and family interactions also modulate how Latinas approach parenting and child care (Garcia Coll, 1990). A deficit of social support from partners and family members and an increase in maternal depression and anxiety have been associated with adverse birth outcomes (Dunkel Schetter, 2011). In addition to psychosocial support, partners may be providing indirect aid to the mother and the infant during pregnancy through financial means or by performing extra household tasks that allow the mother to seek prenatal care (Casper and Hogan, 1990).

An alternative interpretation of the results could be that women who work during pregnancy may be experiencing stressors associated with their job. A meta-analysis of 29 studies found links between physically challenging work environments – "heavy and/or repetitive lifting or load carrying, manual labor, or significant physical exertion" – preterm birth, and small-for-gestational age outcomes in newborns (Mozurkewich et al., 2000, p. 624). Further, when controlling for maternal characteristics and sociodemographic covariates, women who reported having high job strain (high job demand and low/moderate job control) or worked greater than 32 h a week had a decrease in infant birth weight (Vrijkotte et al., 2009). Independent of psychosocial forces in the household, work stressors may uniquely, and directly, impact newborn health. While the present study only focused on a few environmental stressors, we suggest that future research continue to widen the scope to include more environmental and pregnancy-related stressors, and more nuanced measurement of those constructs.

Transmission of ecological stressors to children

A larger question remains about the findings: why would nature create infants susceptible to transmitted prenatal stressors from the mother? Biosocial theories suggest that maternal mental condition transmits salient information to infants pertaining to the quality of the maternal psychosocial environment (Del Giudice, 2012; Kuzawa, 2007). The information received by the infant provides relevant cues that shape developmental and lifetime trajectories. For instance, predictable, low stress environments foster households whereby mothers can invest her time, energy and physiology in a smaller amount of children, increasing health and competitiveness of the children (Ellis et al., 2009). Findings regarding prenatal stress support this hypothesis. When women report having higher levels of psychological resources (mastery, optimism, and self-esteem), those resources directly decrease stress and directly increase infant birth weight (Rini et al., 1999). Similarly, positive attitudes toward the pregnancy predicts higher infant birthweight (Zambrana et al., 1999).

Life history models of development assert that early exposure to unpredictable environments and extrinsic stress alter developmental trajectories that orients physical and social development to "fit" the environment the child resides in (Belsky et al. 1991 and Ellis et al. 2009; see Cabeza de Baca et al., 2016 for a discussion). *Fetal programming* is one possible mechanism that transmits stressors, impacting development and health trajectories in adulthood (Del Giudice, 2012; Kuzawa, 2007; Shonkoff et al., 2012). Using an evolutionary or another ecobiodevelopmental framework (Shonkoff et al., 2012, 2009) suggests that these findings be considered when investigating the *developmental origins of health and disease* (*DOHaD*), which have found associations between adverse birth outcomes, such as low birth weight, and chronic diseases such as metabolic (Norris et al., 2012) and cardiovascular disorders (Risnes et al., 2011) (see Kuzawa, 2007 for a review).

Future directions and clinical implications

Data were longitudinal, emphasizing the developmental processes involved in the ontogeny of minority children (Garcia Coll et al., 1996) and demonstrating the temporal effects of depression on newborn health in Latina mothers. Further, the use of latent measures of depression and newborn health in structural equation modelling are also strengths of the study.

While the results of the present study have implications regarding maternal mental health and adverse birth outcomes, there are limitations. Chronic stressors such as discrimination, disproportionate access to resources and institutions, and employment are important concepts in pregnancy-related anxiety research (Dunkel Schetter, 2011; Dunkel Schetter and Tanner, 2012) and in minority process models of development (Garcia Coll et al., 1996). Future research should include these variables. Another limitation involves the conceptualization of social support among Latina mothers. The present study utilized a dichotomous measure of relationship status (single vs. partnered) as a proxy for partner support. Future research should include better, nuanced measures of social support including measures of partner suppport (e.g., Campos et al., 2008) as well as that provided by extended kin, who may provide supplementary assistance to the mother in Latinas (e.g., Barnett et al., 2015). Further, research on extended kin support should disentangle the social support received from maternal (mother's family) and paternal (father's or other partner's family) kin and whether partner conflict predicts contributions from both families. Because not all part-

ners may be supportive, it may be possible that depressive symptoms are dampened by the presence of strong familial and friend bonds.

Further research may also want to incorporate a continuous measure of planned/unplanned pregnancy (e.g., the London measure of unplanned pregnancy; Barrett et al., 2004) to investigate whether the *degree* or magnitude of the unplanned pregnancy has an effect on newborn health outcomes. Furthermore, future studies should examine other measures of psychosocial functioning and distress, such as perceived stress and anxiety, in addition to depression.

Based on the results of our study, we suggest that maternity care providers, physicians, or midwives caring for pregnant women assess access to social support and depressive symptoms – especially among single women. This could include early pregnancy mental health screening and referring high-risk women to counselors and/or other organizations that may provide care, support and resources to mitigate the effects of maternal depression on newborns.

Acknowledgements

This work was supported by the National Institute of Health grant T32MH019391 to the first author. This work was also supported in part by grants from the Hellman Family Foundation, the Children's Digestive Health and Nutrition Foundation (CDHF), NIH grant DK060617, DK080825 and by NIH/NCRR UCSF-CTSI Grant Number UL1 RR024131.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.midw.2018.05.014.

References

Angel, R., Worobey, J.L., 1988. Single motherhood and children's health. Journal of Health and Social Behavior 29, 38–52. https://doi.org/10.2307/2137179.

Barker, D.J., Osmond, C., Simmonds, S.J., Wield, G.A., 1993. The relation of small head circumference and thinness at birth to death from cardiovascular disease in adult life. BMJ 306, 422–426. https://doi.org/10.1136/bmj.306.6875.422.

Barnett, M.A., Cabeza de Baca, T., Jordan, A., Tilley, E., Ellis, B.J., 2015. Associations among child perceptions of parenting support, maternal parenting efficacy and maternal depressive symptoms. Child Youth Care Forum 44, 17–32. https://doi.org/10.1007/s10566-014-9267-9.

Barrett, G., Smith, S.C., Wellings, K., 2004. Conceptualisation, development, and evaluation of a measure of unplanned pregnancy. Journal of Epidemiology and Community Health 58, 426–433. https://doi.org/10.1136/jech.2003.014787.

Belsky, J., Steinberg, L., Draper, P., 1991. Childhood experience, interpersonal development, and reproductive strategy: an evolutionary theory of socialization. Child Development 62, 647–670. https://doi.org/10.1111/j.1467-8624.1991.tb01558.x.

Berkman, L.F., Zheng, Y., Glymour, M.M., Avendano, M., Börsch-Supan, A., Sabbath, E.L., 2015. Mothering alone: cross-national comparisons of later-life disability and health among women who were single mothers. Journal of Epidemiology and Community Health 69, 865–872. https://doi.org/10.1136/jech-2014-205149.

Bogossian, F.E., 2007. Social support: proposing a conceptual model for application to midwifery practice. Women Birth 20, 169–173. https://doi.org/10.1016/j.wombi.2007.08.003.

Cabeza de Baca, T., Wahl, R.A., Barnett, M.A., Figueredo, A.J., Ellis, B.J., 2016. Adversity, adaptive calibration, and health: the case of disadvantaged families. Adaptive Human Behavior and Physiology 2, 93–115. https://doi.org/10.1007/s40750-016-0042-z.

Campos, B., Schetter, C.D., Abdou, C.M., Hobel, C.J., Glynn, L.M., Sandman, C.A., 2008. Familialism, social support, and stress: positive implications for pregnant Latinas. Cultural Diversity & Ethnic Minority Psychology 14, 155–162. https://doi.org/10.1037/1099-9809.14.2.155.

Casper, L.M., Hogan, D.P., 1990. Family networks in prenatal and postnatal health. Biodemography and Social Biology 37, 84–101. https://doi.org/10.1080/19485565.1990.9988749.

Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. British Journal of Psychiatry 150, 782–786. https://doi.org/10.1192/bjp.150.6.782.

Del Giudice, M., 2012. Fetal programming by maternal stress: insights from a conflict perspective. Psychoneuroendocrinology 37, 1614–1629. https://doi.org/10.1016/j.psyneuen.2012.05.014.

Del Giudice, M., Ellis, B.J., Shirtcliff, E.A., 2011. The adaptive calibration model of stress responsivity. Neuroscience & Biobehavioral Reviews 35, 1562–1592.

Diego, M.A., Jones, N.A., Field, T., et al., 2006. Maternal psychological distress, prenatal cortisol, and fetal weight. Psychosomatic Medicine 68, 747–753. https://doi.org/10.1097/01.psy.0000238212.21598.7b.

Dole, N., 2003. Maternal stress and preterm birth. American Journal of Epidemiology 157, 14–24. https://doi.org/10.1093/aje/kwf176.

Dudgeon, M.R., Inhorn, M.C., 2004. Men's influences on women's reproductive health: medical anthropological perspectives. Social Science & Medicine 59, 1379–1395. https://doi.org/10.1016/j.socscimed.2003.11.035.

Dunkel Schetter, C., 2011. Psychological science on pregnancy: stress processes, biopsychosocial models, and emerging research issues. Annual Review of Psychology 62, 531–558. https://doi.org/10.1146/annurev.psych.031809.130727.

Dunkel Schetter, C., Tanner, L., 2012. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. Current Opinion Psychiatry 25, 141–148. https://doi.org/10.1097/YCO.0b013e3283503680.

Ellis, B.J., 2004. Timing of pubertal maturation in girls: an integrated life history approach. Psychological Bulletin 130, 920–958.

Ellis, B.J., Figueredo, A.J., Brumbach, B.H., Schlomer, G.L., 2009. Fundamental dimensions of environmental risk: the impact of harsh versus unpredictable environments on the evolution and development of life history strategies. Human Nature 20, 204–268.

Ellis, B.J., Garber, J., 2000. Psychosocial antecedents of variation in girls' pubertal timing: maternal depression, stepfather presence, and marital and family stress. Child Development 71, 485–501.

Ellis, B.J., McFadyen-Ketchum, S., Dodge, K.A., Pettit, G.S., Bates, J.E., 1999. Quality of early family relationships and individual differences in the timing of pubertal maturation in girls: a longitudinal test of an evolutionary model. Journal of Personality and Social Psychology 77, 387–401. https://doi.org/10.1037/0022-3514.77.2.387.

Ellison, P.T., 2003. On Fertile Ground. Harvard University Press, Cambridge.

Figueredo, A.J., Vásquez, G., Brumbach, B.H., Sefcek, J.A., Kirsner, B.R., Jacobs, W.J., 2005. The K-factor: individual differences in life history strategy. Personality and Individual Differences 39, 1349–1360. https://doi.org/10.1016/j.paid.2005.06.009.

Flinn, M., 2006. Evolution and ontogeny of stress response to social challenges in the human child. Developmental Review 26, 138–174. https://doi.org/10.1016/j.dr.2006.02.003.

Flinn, M.V., Nepomnaschy, P.A., Muehlenbein, M.P., Ponzi, D., 2011. Evolutionary functions of early social modulation of hypothalamic-pituitary-adrenal axis development in humans. Neuroscience & Biobehavioral Reviews 35, 1611–1629. https://doi.org/10.1016/j.neubiorev.2011.01.005.

Garcia Coll, C., Crnic, K., Lamberty, G., et al., 1996. An integrative model for the study of developmental competencies in minority children. Child Development 67, 1891–1914. https://doi.org/10.1111/j.1467-8624.1996.tb01834.x.

Garcia Coll, C.T., 1990. Developmental utcome of minority infants: a process-oriented look into our beginnings. Child Development 61, 270–289. https://doi.org/10.1111/j.1467-8624.1990.tb02779.x.

Gaudino, J.A., Jenkins, B., Rochat, R.W., 1999. No fathers' names: a risk factor for infant mortality in the State of Georgia, USA. Social Science & Medicine 48, 253–265. https://doi.org/10.1016/S0277-9536(98)00342-6.

Grote, N.K., Bridge, J.A., Gavin, A.R., Melville, J.L., Iyengar, S., Katon, W.J., 2010. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Archives of General Psychiatry 67, 1012–1024. https://doi.org/10.1001/archgenpsychiatry.2010.111.

Grummer-Strawn, L.M., Reinold, C.M., Krebs, N.F.Centers for Disease Control, 2010. Use of World Health Organization and CDC growth charts for children aged 0–59 months in the United States. Morbidity and Mortality Weekly Report MMWR 59, 1–15.

Hrdy, S.B., 2000. Mother nature: Maternal Instincts and How They Shape the Human Species, 1st Ballantine Books edn. Ballantine Books, New York.

Kuzawa, C.W., 2007. Developmental origins of life history: growth, productivity, and reproduction. American Journal of Human Biology 19, 654–661. https://doi.org/10.1002/ajhb.20659.

Lara, M.A., Le, H.-N., Letechipia, G., Hochhausen, L., 2009. Prenatal depression in Latinas in the U.S. and Mexico. Maternal and Child Health Journal 13, 567–576. https://doi.org/10.1007/s10995-008-0379-4.

Lloyd-Jones, D.M., Hong, Y., Labarthe, D., et al., 2010. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American heart association's strategic impact goal through 2020 and beyond. Circulation 121, 586–613. https://doi.org/10.1161/CIRCULATIONAHA.109.192703.

Mozurkewich, E., Luke, B., Avani, M., Wolf, F.M., 2000. Working conditions and adverse pregnancy outcome: a meta-analysis. Obstetrics & Gynecology 95, 623–635. https://doi.org/10.1016/S0029-7844(99)00598-0.

Norris, S.A., Osmond, C., Gigante, D., et al., 2012. Size at birth, weight gain in infancy and childhood, and adult diabetes risk in five low- or middle-income country birth cohorts. Diabetes Care 35, 72–79. https://doi.org/10.2337/dc11-0456.

Puterman, E., Epel, E., 2012. An intricate dance: life experience, multisystem resiliency, and rate of telomere decline throughout the lifespan. Social and Personality Psychology Compass 6, 807–825.

Radloff, L.S., 1977. The CES-D scale: a self-report depression scale for research in the general population. Applied Psychological Measurement 1, 385–401. https://doi.org/10.1177/014662167700100306.

Rini, C.K., Dunkel-Schetter, C., Wadhwa, P.D., Sandman, C.A., 1999. Psychological adaptation and birth outcomes: the role of personal resources, stress, and sociocultural context in pregnancy. Health Psychology 18, 333–345. https://doi.org/10.1037/0278-6133.18.4.333.

Risnes, K.R., Vatten, L.J., Baker, J.L., et al., 2011. Birthweight and mortality in adulthood: a systematic review and meta-analysis. International Journal of Epidemiology 40, 647–661. https://doi.org/10.1093/ije/dyq267.

Seeman, T., Gruenewald, T., Karlamangla, A., et al., 2009. Modeling multisystem biological risk in young adults: the coronary artery risk development

in young adults study. American Journal of Human Biology 22, 463–472. https://doi.org/10.1002/ajhb.21018.
Shonkoff, J.P., Boyce, W.T., McEwen, B.S., 2009. Neuroscience, molecular biology, and the childhood roots of health disparities: building a new framework for health promotion and disease prevention. Journal of the American Medical Association 301, 2252–2259. https://doi.org/10.1001/jama.2009.754.
Shonkoff, J.P., Garner, A.S., Siegel, B.S., et al.The Committee on psychosocial aspects of child and family health, Committee on early childhood, adoption, and dependent care, and section on developmental and behavioral pediatrics, 2012. The lifelong effects of early childhood adversity and toxic stress. Pediatrics 129, e232–e246. https://doi.org/10.1542/peds.2011-2663.
Trivers, R., 1972. Parental investment and sexual selection. In: Campbell, B.G. (Ed.), Sexual Selection & the Descent of Man, 1871–19. Aldine de Gruyter, New York, pp. 136–179.
Vrijkotte, T.G.M., van der Wal, M.F., van Eijsden, M., Bonsel, G.J., 2009. First-trimester working conditions and birthweight: a prospective cohort study. American Journal of Public Health 99, 1409–1416. https://doi.org/10.2105/AJPH.2008.138412.
Wojcicki, J.M., Holbrook, K., Lustig, R.H., Caughey, A.B., Muñoz, R.F., Heyman, M.B., 2011a. Infant formula, tea, and water supplementation of Latino infants at 4–6 weeks postpartum. Journal of Human Lactation 27, 122–130. https://doi.org/10.1177/0890334410396510.
Wojcicki, J.M., Holbrook, K., Lustig, R.H., et al., 2011b. Chronic maternal depression is associated with reduced weight gain in Latino infants from birth to 2 years of age. PLoS ONE 6, e16737. https://doi.org/10.1371/journal.pone.0016737.
Zambrana, R.E., Dunkel-Schetter, C., Collins, N.L., Scrimshaw, S.C., 1999. Mediators of ethnic-associated differences in infant birth weight. Journal of Urban Health 76, 102–116. https://doi.org/10.1007/BF02344465.

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