



Published in final edited form as:

Birth. 2016 June ; 43(2): 159–166. doi:10.1111/birt.12221.

A Prospective Investigation of Prenatal Mood and Childbirth Perceptions in an Ethnically Diverse, Low-Income Sample

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Abstract

Introduction—Few studies have examined prenatal mood as a means to identify women at risk for negative childbirth experiences. We explore associations between prenatal mood and birth perceptions in a socioeconomically diverse, American sample.

Methods—We conducted a prospective study of 136 predominantly low-income and ethnic minority women of mixed parity. Prenatal measures of perceived stress, pregnancy-related anxiety, and depressive symptoms were used to predict maternal perceptions of birth experiences one month postpartum using the Childbirth Experience Questionnaire (CEQ; 1).

Results—After adjusting for sociodemographic variables and mode of delivery, higher third trimester stress predicted worse CEQ total scores. This association was predominantly explained by two CEQ domains: *own capacity* (e.g. feelings of control and capability) and *perceived safety*. Pregnancy-related anxiety and depressive symptoms correlated with perceived stress, though neither independently predicted birth experience. Unplanned cesareans were associated with a worse CEQ total score. Vaginal delivery predicted greater *perceived safety*. Altogether, sociodemographic covariates, mode of delivery, and prenatal mood accounted for 35% of the variance in birth experience ($p < .001$).

Discussion—Our finding that prenatal stress explains a significant and likely clinically meaningful proportion of the variance in birth experience suggests that women perceive and recall

their birth experiences through a lens that is partially determined by preexisting personal circumstances and emotional reserves. Since childbirth perceptions have implications for maternal and child health, patient satisfaction, and healthcare expenditures, these findings warrant consideration of prenatal stress screening to target intervention for women at risk for negative birth experiences.

Keywords

birth; prenatal stress; pregnancy-related anxiety; prenatal depression

Introduction

Childbirth is the leading reason for hospitalization in the United States, and maternal perceptions of this experience have important implications for women and their offspring. Empirical data on the prevalence of negative birth experiences is lacking, though we know that it predicts poor mental health outcomes, including postpartum depression (2) and post-traumatic stress disorder (3). Following a traumatic birth, women are more likely to fear subsequent childbirth (4) and have lower future fertility rates (5). These effects on perinatal mood have the potential to influence offspring outcomes, as perinatal mood predicts intention to breastfeed (6), maternal-infant attachment (7), offspring emotion regulation and social engagement (8), and child cognitive function (9). Health outcomes aside, negative obstetric experiences have economic impact as well. Perceived poor provider-patient communication, a key component of birth experience (10), leads to higher rates of malpractice suit intention after perceived adverse events (11). Mental health service provision for women and support services for their children constitute additional fiscal burden. Collectively, the maternal and child health burden as well as the economic burden support the need to further characterize and minimize negative birth experiences.

Most studies examining the components of childbirth perceptions have focused specifically on intrapartum factors. For instance, unplanned cesarean delivery and other medical complications reliably predict negative experiences (4,12–13). Another commonly cited predictor is the magnitude of discrepancy between expected and actual experiences (14,15), with emergency cesareans and medical complications as examples of deviations from expectations. The same may be true for pain, as a review on obstetric patient pain concluded that the discrepancy between anticipated pain and postnatal pain recall was a better predictor of birth experience than was the postnatal pain score alone (10). Remarkably, the provider-patient relationship has been demonstrated to be an even more powerful predictor of patient satisfaction than both pain and medical complications (10). Interventions that enhance social support have been effective at improving birth experience (16), even when compared to analgesia interventions (10). Observational studies provide additional evidence for the social support role of medical providers (17–18). One facet of the patient-provider relationship is the degree to which laboring women participate in medical decision-making. Perceptions of involvement in clinical decisions contribute to a sense of control over labor, another important aspect of birth experience (12,14,15,17,19). Overall, psychosocial characteristics such as perceived support and sense of control appear to be prominent intrapartum

predictors of birth experience. Many studies suggest that psychosocial factors in the months preceding delivery may be relevant as well (4,17,18,20,21).

Anxiety and depressive symptoms have been shown to be relatively stable from pregnancy through postpartum (22) and are thus likely to color women's perceptions and memories of childbirth. Yet there has been relatively little investigation into the contributions of prenatal mood or preexisting psychological distress to birth experiences. In one study, overall psychological health in early pregnancy predicted types of dissatisfaction and emotional reactions during labor (17). Others have explored various measures of antenatal anxiety. High levels of generalized worry (18) and fear of childbirth (4,20) during pregnancy predicted a negative birth experience in primiparous women. Additionally, women with higher antenatal state anxiety more frequently recalled birth as a traumatic experience (21). Given evidence that prenatal mood may predict birth perceptions, pregnancy may be an appropriate time for interventions designed to improve birth experiences. However, for women reporting high fear of childbirth, prenatal group therapy and guided relaxation training have yielded mixed results (23–25). Prenatal mindfulness training shows promise in improving birth experience (26) and postnatal mood (27,28), though these studies have generally included small samples comprised of predominantly white, middle-to-upper socioeconomic status (SES) women, thus limiting generalizability. There is a need to broaden this limited literature to further elucidate the relation between prenatal mood and birth experience, particularly given the high prevalence of dysphoric mood during pregnancy.

Symptoms of anxiety and depression are pervasive among pregnant women, with estimated rates of 54% for anxiety and 37% for depressive symptoms (29). Clinically diagnosed mood disorders are less prevalent though still relatively common during pregnancy (30). Little is known about the epidemiology of prenatal mood in vulnerable populations such as ethnic minorities or low-income women, though one study of 166 pregnant African-American and Latina women found that more than half reported symptoms consistent with a clinical diagnosis of depression (7). Minorities are more likely to live in poor communities, where they are exposed to a range of chronic stressors. They may also experience more frequent or stressful life events and have fewer social supports to buffer the effects of stress on mental health (31), both of which are associated with worse perinatal mood (32). In summary, limited data suggest that ethnic minorities and women of low SES experience a higher risk of dysphoric prenatal mood. Yet data on childbirth perceptions in these women is sparse, making it imperative that women from diverse backgrounds be included in investigations of prenatal mood and birth experience.

American women as a whole represent an additional understudied group with regards to birth experience, with only a few published studies on American samples (15,21,33). Our current understanding of birth experience is almost entirely based upon Northern European or Australian studies. Although the literature suggests that birth experiences across the developed world do not significantly differ, better characterizing the experiences of socioeconomically vulnerable American women could have implications for clinical quality improvement (10).

To fill the gaps in these literatures, we examined the relation between prenatal mood and birth perceptions within a sample of ethnically and socioeconomically diverse American women. To understand the range of factors involved in childbirth perceptions, we analyzed the relative contributions of three common types of negative mood during pregnancy: stress, pregnancy-associated anxiety, and depressive symptoms. Based upon the limited but consistent literature that generalized anxiety and fear of birth relate to birth experience, we hypothesized that both global stress and pregnancy-associated anxiety would predict birth experience in our sample. Little is known about prenatal depression as it pertains to birth experience, though patients with depressive disorders report lower levels of satisfaction with care (34), and women with worse depressive symptoms are likely to have lower self-efficacy (35). In the context of the peripartum period, we expected this relation to manifest as more negative birth experiences, such as a lower sense of control.

Methods

Participants

Participants were drawn from the Maternal Adiposity, Metabolism, and Stress (“MAMAS”) study, a controlled trial of a mindfulness-based small-group intervention to reduce stress and prevent excess weight gain during pregnancy. This sample was recruited from prenatal clinics and community centers throughout the San Francisco Bay Area in California, U.S.A. Due to the study focus on weight gain in populations experiencing high stress levels, participants were overweight or obese and predominantly low-income. Inclusion criteria were that women were 18–45 years of age, 8–23 weeks pregnant with a singleton gestation, had a BMI > 25 kg/m², and had household incomes less than 500% of the federal poverty level, a U.S. indicator of low- to middle-income. Medical conditions that may interfere with baseline body composition (e.g. polycystic ovarian syndrome, preexisting diabetes, active substance abuse) were exclusionary.

Participants with live births were contacted postpartum for recruitment into the Stress, Eating, and Early Development (“SEED”) follow-up study of offspring. The subset of enrolled women who completed the third trimester as well as the early postnatal questionnaires were included in these analyses. Of the 190 women who completed third trimester questionnaires, 145 (76%) enrolled in the postnatal follow-up study, and 136 (72%) completed postnatal questionnaires. There were no differences in baseline characteristics or prenatal mood between the women who consented to postnatal follow-up as compared to those who declined or who were lost to follow-up. Table 1 provides a detailed description of this study’s sample demographic and obstetric characteristics, and details are described below in Results.

Measures

Participants completed prenatal questionnaires on paper. The postnatal questionnaire was administered verbally and in person at a target timeframe of one month postpartum. Women reported age, BMI, parity, marital or partnered status, race and ethnicity, education, and annual household income. Household income was converted to percent of U.S. federal poverty level, which adjusts for household size, which we approximated using number of

children in the household and marital/partner status, assuming those with partners were cohabitating. Assignment to the prenatal intervention or control group was coded as a dichotomous variable. While intervention effects were not the focus of the present analyses, we expected that group participation might relate to birth experience and thus included it in our multivariate model.

Women reported on three measures of prenatal mood. Cohen's Perceived Stress Scale (36), a widely used and well-validated assessment, was used to measure generalized stress and coping over the previous month. It consisted of ten items on a five-point Likert scale. Positively worded items were reverse coded so that a higher score indicated worse symptomatology. The Pregnancy-Related Anxiety Scale assesses worry about a woman's own health, her baby's health, labor and delivery, and newborn care (37,38). Participants responded to ten items on a four-point Likert scale. The Patient Health Questionnaire (39), a depression screening tool commonly used in primary care settings, has been validated in pregnant women (40). The nine questions are drawn from the Diagnostic and Statistical Manual Fourth Edition criteria for depression. Each item assesses how often participants were bothered by various problems, with responses ranging from 0 to 3 (*not at all, several days, more than half the days, or nearly every day*). Mean scores were computed for each of the prenatal mood questionnaires as long as greater than 75% of the items in the respective scale were answered.

Birth experience was measured using the Childbirth Experience Questionnaire (CEQ;1), a 22-item assessment of four birth experience domains. The *own capacity* subscale assessed feelings of control or internal strength as well as pain (e.g. "I felt capable"), and hereafter will be referred to as "sense of control." *Professional support* items assessed provider care and communication (e.g. "my provider understood my needs"). *Perceived safety* items assessed sense of security and memories (e.g. "I felt scared"). *Participation* assessed choice and personal influence (e.g. "I could choose the delivery position"). Nineteen of the twenty-two items consisted of four-point Likert scale response options. The three items assessing memory of labor pain, level of control, and sense of security were measured on 100-mm visual analog scales, which were transformed to categorical values using cutoffs published by Dencker *et al.* (0–40mm=1, 41–60mm=2, 61–80mm=3, 81–100mm=4). Positively worded items were reverse coded so that a higher score indicated a more positive experience. Mean scores were computed for each of the birth experience subscales as long as greater than 75% of the items in the respective subscale were answered.

The CEQ was originally validated in Sweden and has not been utilized in a primarily English-speaking sample. The authors provided us with an unvalidated English version, which we modified slightly for our sample (i.e. "midwife" was replaced with "provider" and "during the dilation stage" was simplified to "during labor." Internal consistency of the *sense of control*, *professional support*, and *perceived safety* subscales was good (Cronbach's $\alpha=.71$, $.91$, and $.72$, respectively; see Table 2). In contrast, the three-item subscale, *participation*, had poor internal consistency ($\alpha=.50$) in our sample.

We further tested scaling assumptions by exploring the CEQ's ability to discriminate between groups known to differ with regards to birth experience: spontaneous vaginal

compared to operative vaginal and cesarean deliveries. Women with non-operative deliveries reported higher scores on the *own capacity* ($t(135)=2.2, p<.05$), *perceived safety* ($t(135)=4.8, p<.001$), and *participation* ($t(135)=4.1, p<.001$) subscales. As in the original validation study, visualization of the *professional support* score distribution revealed a substantial ceiling effect, limiting its sensitivity to these known group differences ($t(135)=1.67, p=.10$). Keeping in mind the limitations of low internal consistency for *participation* and lack of discrimination by delivery type for *professional support*, we proceeded with our analyses utilizing the subscales as they were originally published.

Statistical Analysis

Analyses were performed using IBM SPSS Statistics Version 22 after data were assessed for normal distribution and outliers. Bivariate correlations between all potential covariates, independent variables and birth experience variables were assessed prior to model building. One-way ANOVA was used to identify differences in birth experiences between women who delivered via planned versus unplanned cesarean. Finally, sociodemographic covariates, mode of delivery, and prenatal mood variables were entered into a multiple linear regression model in stepwise fashion to determine their relative contributions to the overall prediction of birth experience. The multivariate regression model was tested separately for five dependent variables: the CEQ total score and four CEQ subscale means.

Results

Table 1 shows sample descriptive statistics and delivery details. Participants were 18–42 years of age. The majority were married or partnered and multiparous. Approximately 27% had completed high school or less, 54% had some college or vocational training, and 20% had earned a college degree. Annual household income was \$0–\$86,000 (Median= \$19,000) with the majority of the sample falling below the U.S. poverty level for a family of four at the time of data collection (\$22,550 in 2013; 41). Eight-five percent of women self-reported as ethnic or racial minorities. The cesarean rate was 27%, which was below the 2012 U.S. and California rates of 33% but representative of the county regions we sampled (range 26–29%; 42). Average delivery timing was at 39.5 weeks.

Bivariate associations between primary predictors and outcomes are presented in Table 3. Of note, prenatal stress, pregnancy-related anxiety, and depressive symptoms were at least moderately inter-correlated. Unplanned cesarean was associated with worse birth experience as compared to planned cesareans. Mode of delivery was therefore included in regression models as two dummy coded variables; planned cesarean was the reference group. Participation in the study intervention was associated with one domain of birth experience, *sense of control*, and was thus included as a covariate in the final model. Race/ethnicity was coded and analyzed as three separate dummy coded variables (i.e. African American, Latina, and Caucasian, with Other as the reference group).

Linear regression results for the full model including covariates and prenatal mood predictors are shown in Table 4. Race, age, parity, and BMI were not related to birth experience. An unplanned cesarean was associated with worse *sense of control*, and a vaginal birth predicted higher *perceived safety* during childbirth. Within this fully-adjusted

model, after accounting for covariates and mood, intervention group assignment predicted lower *sense of control*. Elevated third trimester perceived stress uniquely predicted both the *sense of control* and *perceived safety* domains of birth experience. Although bivariate correlations suggested that anxiety and depression were related to birth experience, neither accounted for unique variance in childbirth experience. Altogether, sociodemographic covariates, mode of delivery, and prenatal stress and mood accounted for 35% of the variance in total CEQ scores.

Discussion

To our knowledge, this is the first study to prospectively examine multiple dimensions of prenatal mood to understand their relative contributions to perceptions of labor and delivery. Our hypothesis was partially supported. We had expected that all three mood variables (i.e. perceived stress, pregnancy-associated anxiety, and depression) would relate to birth experience, yet when considered together, only stress predicted a worse experience. The perceived stress construct differs from objective measures of stress that query about the occurrence of specific stressful events (e.g. trauma, divorce). *Perceived stress* may indicate more frequent or severe stressful events– or a heightened sensitivity to environmental stressors. The *reserve capacity model* provides potential rationale for our findings, positing that increased exposure to stress incrementally diminishes intrapsychic and interpersonal resources needed to cope with subsequent stressors, increases negative emotion, and decreases positive emotion (43). Applying this model to our findings, women who were exposed to greater stress prenatally may have had less emotional reserve to cope with the stress of labor and delivery. Further, they may have had more negative affect, which could influence how they perceive and recall emotions and events from childbirth. Drawing upon the concept of individual variation in stress sensitivity, we also consider the possibility that women who reported poorer ability to cope with stressors during pregnancy might be more susceptible or reactive to stressful circumstances – suboptimal labor support or delivery complications as examples.

The finding that pregnancy-associated anxiety and depression were unrelated to birth experience was unexpected given evidence that greater fear of childbirth predicts negative birth experiences (18) and theory suggesting depression would play a role in birth experience (34,35). However findings suggest that stress is most predictive of birth experience. Notably, scores on our three mood measures were moderately correlated, demonstrating that many women who reported depressive symptoms or expressed pregnancy-related worry also felt generally stressed. It may be that pregnancy-related anxiety is more specific to the perinatal period, whereas our findings suggest that perceived stress more broadly predicts risk for a negative birth experience.

Women of lower SES bear an increased burden of stressors during pregnancy (31). We found that greater stress predicted worse birth experiences within our predominantly low-income sample, after adjusting for individual income. Individual income did not uniquely predict birth experience in our sample, although this may have been due to the limited range of income for our participants. The relation between SES and patient expectations is controversial and confounded by methodological challenges (44), although some studies

have shown that people of lower SES are less likely to file malpractice claims (11,45). Findings from our study may be useful for understanding the unique roles of income and stress on birth experience, particularly within diverse samples.

The generalizability of these findings may be limited due to the relatively small sample size and sample characteristics. We oversampled racial/ethnic minority and low-income women, yet our sample is more representative of U.S. women in that regard as compared to existing birth experience literature. Our study also included only overweight or obese women, and pre-pregnancy BMI has been associated with factors that could influence birth experience (e.g. pregnancy complications, cesarean deliveries, macrosomia) (46,47); however, BMI was unrelated to birth experience in our models. In the context of an estimated overweight/obesity rate of 42% for U.S. pregnant women (48), these findings have strong potential to inform work with nearly half of the U.S. population of pregnant women. The inclusion of primiparous and multiparous women revealed that parity was not related birth experience in our sample. We did not have information on women's previous birth experiences, thus future research could build upon our study by exploring both the number of prior births and prior birth experiences.

Most interventions designed to improve birth experience and patient satisfaction have narrowly focused on intrapartum clinical support. Broadening the scope to the prenatal period reveals a need for long-term policy objectives (e.g. maternity leave policy) designed to alleviate common stressors for pregnant women, particularly low-income women. On an individual level, there is a need to investigate interventions to improve coping with chronic stress and adversity. An intervention that improves emotion regulation and mood in expectant mothers may have benefits beyond birth experience, as demonstrated by evidence that prenatal psychosocial stress affects a variety of important health outcomes for mothers and children, such as timing of delivery (49) and labor complications (50). Likewise, we urge researchers investigating prenatal stress reduction interventions for outcomes other than birth experience to include a measure of birth experience as a potential moderator of maternal mental health, birth, or offspring developmental outcomes.

These results have clinical implications as well. Prenatal care providers routinely screen for depressive symptoms to identify women at risk for postpartum depression. Our findings strengthen the rationale for prenatal mood screening and point to the possibility that expanding screening to include global perceived stress may help identify women who may benefit from an intervention designed to improve coping with stress during pregnancy and delivery. In addition, our data were consistent with the well-documented relation between mode of delivery and birth experience, supporting the need to reduce the number of medically unnecessary cesarean deliveries.

In conclusion, our finding that prenatal stress explains a significant and likely clinically meaningful proportion of the variance in birth experience suggests that women perceive and recall childbirth through a lens that is in part determined by preexisting personal circumstances, mode of delivery, and emotional reserves. Since birth experience has implications for maternal and child health, patient satisfaction, and healthcare expenditures, we recommend further characterization of the prenatal period as it pertains to birth

experience. We also suggest consideration of perceived stress screening to identify women at risk for negative birth experiences.

Acknowledgments

This research was supported by NIH 1 U01 HL097973, NHLBI 5 R01 HL116511-02, the Robert Wood Johnson Health and Society Scholars Program, the Lisa and John Pritzker Family Foundation, UCSF-CTSI UL1 TR000004, the Albert Brodie Smith and Margaret Gretchen Smith Scholarship, and the Schoeneman Endowment Fund.

References

- Dencker A, Taft C, Bergqvist L, Lilja H, Berg M. Childbirth experience questionnaire (CEQ): development and evaluation of a multidimensional instrument. *BMC Pregnancy Childbirth BioMed Central Ltd.* 2010; 10(1):81.
- Söderquist J, Wijma B, Thorbert G, Wijma K. Risk factors in pregnancy for post-traumatic stress and depression after childbirth. *BJOG: Int J O&G.* 2009 Apr; 116(5):672–80.
- Grekin R, O'Hara MW. Prevalence and risk factors of postpartum posttraumatic stress disorder: a meta-analysis. *Clin Psychol Rev.* 2014 Jul; 34(5):389–401. [PubMed: 24952134]
- Nilsson C, Lundgren I, Karlström A, Hildingsson I. Self reported fear of childbirth and its association with women's birth experience and mode of delivery: a longitudinal population-based study. *Women Birth.* 2012 Sep; 25(3):114–21. [PubMed: 21764400]
- Gottvall K, Waldenström U. Does a traumatic birth experience have an impact on future reproduction? *BJOG: Int J O&G.* 2002 Mar; 109(3):254–60.
- Fairlie TG, Gillman MW, Rich-Edwards J. High pregnancy-related anxiety and prenatal depressive symptoms as predictors of intention to breastfeed and breastfeeding initiation. *J Womens Health (Larchmt).* 2009 Jul; 18(7):945–53. [PubMed: 19563244]
- Alhusen JL, Gross D, Hayat MJ, Rose L, Sharps P. The role of mental health on maternal-fetal attachment in low-income women. *J Obstet Gynecol Neonatal Nurs.* 2012 Nov; 41(6):E71–81.
- Feldman R, Granat A, Pariente C, Kanety H, Kuint J, Gilboa-Schechtman E. Maternal Depression and Anxiety Across the Postpartum Year and Infant Social Engagement, Fear Regulation, and Stress Reactivity. *J Am Acad Child Adolesc Psychiatry.* 2009 Sep; 48(9):919–27. [PubMed: 19625979]
- Stein A, Pearson RM, Goodman SH, Rapa E, Rahman A, McCallum M, et al. Effects of perinatal mental disorders on the fetus and child. *Lancet.* 2014 Nov 15; 384(9956):1800–19. [PubMed: 25455250]
- Hodnett ED. Pain and women's satisfaction with the experience of childbirth: a systematic review. *Am J Obstet Gynecol.* 2002 May; 186(5):S160–72. [PubMed: 12011880]
- Moore PJ, Adler NE, Robertson PA. Medical malpractice: the effect of doctor-patient relations on medical patient perceptions and malpractice intentions. *West J Med.* 2000 Oct; 173(4):244–50. [PubMed: 11017984]
- Waldenström U, Hildingsson I, Rubertsson C, Rådestad I. A negative birth experience: prevalence and risk factors in a national sample. *Birth.* 2004 Mar; 31(1):17–27. [PubMed: 15015989]
- Bryanton J, Gagnon AJ, Johnston C, Hatem M. Predictors of Women's Perceptions of the Childbirth Experience. *J Obstet Gynecol Neonatal Nurs.* 2008 Jan 22; 37(1):24–34.
- Christiaens W, Bracke P. Assessment of social psychological determinants of satisfaction with childbirth in a cross-national perspective. *BMC Pregnancy Childbirth.* 2007; 7(1):26. [PubMed: 17963491]
- Goodman P, Mackey MC, Tavakoli AS. Factors related to childbirth satisfaction. *J Adv Nurs.* 2004 Apr; 46(2):212–9. [PubMed: 15056335]
- Hodnett ED, Gates S, Hofmeyr GJ, Sakala C. Continuous support for women during childbirth. *Cochrane Database Syst Rev.* 2007; (3):CD003766. [PubMed: 17636733]
- Rudman A, El-Khoury B, Waldenström U. Women's satisfaction with intrapartum care - a pattern approach. *J Adv Nurs.* 2007 Sep; 59(5):474–87. [PubMed: 17645495]

18. Larsson C, Saltvedt S, Edman G, Wiklund I, Andolf E. Factors independently related to a negative birth experience in first-time mothers. *Sex Reprod Healthc*. 2011 Apr; 2(2):83–9. [PubMed: 21439526]
19. Lavender T, Walkinshaw SA, Walton I. A prospective study of women's views of factors contributing to a positive birth experience. *Midwifery*. 1999 Mar; 15(1):40–6. [PubMed: 10373872]
20. Elvander C, Cnattingius S, Kjerulff KH. Birth experience in women with low, intermediate or high levels of fear: findings from the first baby study. *Birth*. 2013 Dec; 40(4):289–96. [PubMed: 24344710]
21. Soet JE, Brack GA, DiIorio C. Prevalence and Predictors of Women's Experience of Psychological Trauma During Childbirth. *Birth*. 2003 Mar; 30(1):36–46. [PubMed: 12581038]
22. Heron J, O'Connor TG, Evans J, Golding J, Glover V. Alspac Study Team. The course of anxiety and depression through pregnancy and the postpartum in a community sample. *J Affect Disord*. 2004 May; 80(1):65–73. [PubMed: 15094259]
23. Rouhe H, Salmela-Aro K, Toivanen R, Tokola M, Halmesmäki E, Saisto T. Obstetric outcome after intervention for severe fear of childbirth in nulliparous women - randomised trial. *BJOG: Int J O&G*. 2013 Jan; 120(1):75–84.
24. Rouhe H, Salmela-Aro K, Toivanen R, Tokola M, Halmesmäki E, Ryding E-L, et al. Group psychoeducation with relaxation for severe fear of childbirth improves maternal adjustment and childbirth experience - a randomised controlled trial. *J Psychosom Obstet Gynaecol*. 2014 Nov. 24:1–9.
25. Bergström M, Kieler H, Waldenström U. Psychoprophylaxis during labor: associations with labor-related outcomes and experience of childbirth. *Acta Obstet Gynecol Scand*. 2010 Jun; 89(6):794–800. [PubMed: 20225989]
26. Duncan L, Cohn M, Chao M, Cook J, Riccobono J, Bardacke N. Mind in labor: effects of mind/body training on childbirth appraisals and pain medication use during labor. *J Altern Complement Med*. 2014 May.20(5):A17.
27. Dunn C, Hanieh E, Roberts R, Powrie R. Mindful pregnancy and childbirth: effects of a mindfulness-based intervention on women's psychological distress and well-being in the perinatal period. *Arch Womens Ment Health*. 2012 Apr; 15(2):139–43. [PubMed: 22382281]
28. Vieten C, Astin J. Effects of a mindfulness-based intervention during pregnancy on prenatal stress and mood: results of a pilot study. *Arch Womens Ment Health*. 2008; 11(1):67–74. [PubMed: 18317710]
29. Lee AM, Lam SK, Sze Mun Lau SM, Chong CSY, Chui HW, Fong DYT. Prevalence, Course, and Risk Factors for Antenatal Anxiety and Depression. *Obstet Gynecol*. 2007 Nov; 110(5):1102–12. [PubMed: 17978126]
30. Gavin NI, Gaynes BN, Lohr KN, Meltzer-Brody S, Gartlehner G, Swinson T. Perinatal depression: a systematic review of prevalence and incidence. *Obstet Gynecol*. 2005 Nov; 106(5 Pt 1):1071–83. [PubMed: 16260528]
31. Nagahawatte NT, Goldenberg RL. Poverty, maternal health, and adverse pregnancy outcomes. *Ann N Y Acad Sci*. 2008; 1136:80–5. [PubMed: 17954684]
32. Séguin L, Potvin L, St-Denis M, Loiselle J. Depressive symptoms in the late postpartum among low socioeconomic status women. *Birth*. 1999 Sep; 26(3):157–63. [PubMed: 10655815]
33. Mercer RT, Hackley KC, Bostrom AG. Relationship of Psychosocial and Perinatal Variables to Perception of Childbirth. *Nurs Res*. 1983; 32(4):202. [PubMed: 6553242]
34. Jackson JL, Chamberlin J, Kroenke K. Predictors of patient satisfaction. *Soc Sci Med*. 2001 Feb; 52(4):609–20. [PubMed: 11206657]
35. Maciejewski PK, Prigerson HG, Mazure CM. Self-efficacy as a mediator between stressful life events and depressive symptoms. Differences based on history of prior depression. *Br J Psychiatry*. 2000 Apr.176:373–8. [PubMed: 10827887]
36. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983 Dec; 24(4):385–96. [PubMed: 6668417]
37. Alderdice F, Lynn F, Lobel M. A review and psychometric evaluation of pregnancy-specific stress measures. *J Psychosom Obstet Gynaecol*. 2012 Jun; 33(2):62–77. [PubMed: 22554138]

38. Rini CK, Dunkel-Schetter C, Wadhwa PD, Sandman CA. Psychological adaptation and birth outcomes: the role of personal resources, stress, and sociocultural context in pregnancy. *Health Psychol.* 1999 Jul; 18(4):333–45. [PubMed: 10431934]
39. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001 Sep; 16(9):606–13. [PubMed: 11556941]
40. Sidebottom AC, Harrison PA, Godecker A, Kim H. Validation of the Patient Health Questionnaire (PHQ)-9 for prenatal depression screening. *Arch Womens Ment Health.* 2012 Oct; 15(5):367–74. [PubMed: 22983357]
41. Annual Update of the Health and Human Services Poverty Guidelines. U.S. Dept of Health and Human Services; 2013 Jan. p. 3637-8. Report Number: fr20ja11-76
42. Martin, JA., Hamilton, BE., Osterman, MJ., Curtin, SC., Mathews, TJ. National Vital Statistics Reports. Vol. 62. U.S. Dept of Health and Human Services; 2013 Dec.
43. Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychol Bull American Psychological Association.* 2003; 129(1):10–51.
44. Sitzia J, Wood N. Patient satisfaction: a review of issues and concepts. *Soc Sci Med.* 1997 Dec; 45(12):1829–43. [PubMed: 9447632]
45. Burstin HR, Johnson WG, Lipsitz SR, Brennan TA. Do the poor sue more? A case-control study of malpractice claims and socioeconomic status. *JAMA.* 1993 Oct 13; 270(14):1697–701. [PubMed: 8411499]
46. Bodnar LM, Wisner KL, Moses-Kolko E, Sit D, Hanusa BH. Prepregnancy body mass index, gestational weight gain, and the likelihood of major depressive disorder during pregnancy. *J Clin Psychiatry.* 2009 Sep; 70(9):1290–6. [PubMed: 19607761]
47. Baeten JM, Bukusi EA, Lambe M. Pregnancy complications and outcomes among overweight and obese nulliparous women. *Am J Public Health.* 2001 Mar; 91(3):436–40. [PubMed: 11236410]
48. Fisher SC, Kim SY, Sharma AJ, Rochat R, Morrow B. Is obesity still increasing among pregnant women? Prepregnancy obesity trends in 20 states, 2003–2009. *Prev Med.* 2013 Jun; 56(6):372–8. [PubMed: 23454595]
49. Lobel M, Dunkel-Schetter C, Scrimshaw SC. Prenatal maternal stress and prematurity: a prospective study of socioeconomically disadvantaged women. *Health Psychol.* 1992; 11(1):32–40.
50. Da Costa D, Dritsa M, Larouche J, Brender W. Psychosocial predictors of labor/delivery complications and infant birth weight: a prospective multivariate study. *J Psychosom Obstet Gynaecol.* 2000 Sep; 21(3):137–48. [PubMed: 11076335]

Table 1

Sociodemographic and Delivery Characteristics of MAMAS-SEED Study Participants (N=136), California, 2010–2013

	<i>Mean [SD] or n (%)</i>
Maternal age (yrs)	28.2 (5.6)
Primiparous	57 (41.9%)
Married or partnered	92 (67.6%)
Maternal education	
Less than high school	13 (9.6%)
High school grad	23 (16.9%)
Some college/vocational	73 (53.7%)
College degree or higher	27 (19.9%)
Household income (\$1,000/yr)	\$23.6 (20.0)
Race/ethnicity	
African American	55 (40.4%)
Latina	41 (30.1%)
White	20 (14.7%)
Other/Multi-ethnic	17 (12.5%)
Asian	3 (2.2%)
Mode of delivery	
Vaginal	100 (73.5%)
Cesarean	36 (26.5%)
Planned cesarean	17 (47.2%)
Unplanned cesarean	19 (52.8%)
Delivery location	
Private hospital	74 (54.4%)
University-affiliated hospital	33 (24.3%)
Public hospital	27 (19.9%)
Home	2 (1.5%)
Maternal BMI (kg/m²)	30.7 (5.0)
Birth weight (kg)	3.36 (.43)
Gest. age at birth (wks)¹	39.5 (1.6)
Wks postpartum at survey	5.4 (2.7)

¹Nine (7%) delivered preterm (i.e. before 37 weeks); two of whom delivered in the early preterm period (i.e. before 32 weeks); MAMAS=Maternal Adiposity, Metabolism, and Stress; SEED=Stress, Eating, and Early Development.

Table 2

MAMAS-SEED Study Participants' Birth Experience and Prenatal Mood Scores; Reliability of CEQ Subscales (N=136); California, 2010–2013

	<i>Mean</i>	<i>SD</i>	<i>Cronbach's α</i>
<i>CEQ Total Score</i> ¹	3.1	.48	.86
<i>CEQ Sense of Control</i> ¹	2.8	.55	.71
<i>CEQ Prof. Support</i> ¹	3.6	.58	.91
<i>CEQ Perceived Safety</i> ¹	3.2	.59	.72
<i>CEQ Participation</i> ¹	3.1	.76	.50
<i>PSS</i> ²	1.6	.67	
<i>PRA</i> ¹	2.0	.61	
<i>PHQ</i> ³	0.6	.48	

¹Possible range 1–4;

²Possible range 0–4;

³Possible range 0–3; MAMAS=Maternal Adiposity, Metabolism, and Stress; SEED=Stress, Eating, and Early Development; CEQ=Childbirth Experience Questionnaire; PSS=Perceived Stress Scale; PRA=Pregnancy-related Anxiety; PHQ=Patient Health Questionnaire.

Bivariate Correlations between Prenatal Mood and Birth Experience in the MAMAS-SEED Study (N=136), California, 2010–2013

Table 3

	CEQ-T	CEQ-C	CEQ-PS	CEQ-S	CEQ-P	PSS	PRA
CEQ-C	.86 ^{***}						
CEQ-PS	.76 ^{***}	.48 ^{***}					
CEQ-S	.88 ^{***}	.66 ^{***}	.60 ^{***}				
CEQ-P	.61 ^{***}	.35 ^{***}	.36 ^{***}	.43 ^{***}			
PSS	-.34 ^{***}	-.42 ^{***}	-.19 [*]	-.25 ^{**}	-.14		
PRA	-.24 ^{**}	-.20 [*]	-.15 [†]	-.20 [*]	-.22 ^{**}	0.35 ^{***}	
PHQ	-.19 [*]	-.19 [*]	-.18 [*]	-.13	-.09	0.61 ^{***}	0.27 ^{**}

[†] $p < 0.10$,

^{*} $p < .05$,

^{**} $p < .01$,

^{***} $p < .001$.

MAMAS=Maternal Adiposity, Metabolism, and Stress; SEED=Stress, Eating, and Early Development; CEQ=Childbirth Experience Questionnaire with subscales, T=Total Score, C=Sense of Control, PS=Professional Support, S=Perceived Safety, P=Participation; PSS=Perceived Stress Scale; PRA=Perceived Stress Scale; PHQ=Patient Health Questionnaire.

Table 4
Multiple Linear Regression of Birth Experience, Prenatal Mood, and Sociodemographic Covariates from the MAMAS-SEED Study (N=136), California, 2010–2013

<i>CEQ (β)</i>	<i>Total Score</i>	<i>Sense of Control</i>	<i>Prof. Support</i>	<i>Perceived Safety</i>	<i>Particip.</i>
<i>Income</i> ¹	-.16 [†]	-.11	-.16	-.12	-.12
<i>Af. Amer.</i>	.12	.04	.07	.17	.12
<i>Latina</i>	.03	.02	-.04	.06	.07
<i>Caucasian</i>	.10	.05	.03	.06	.22*
<i>Parity</i> ²	-.10	-.17*	.04	-.08	-.06
<i>Age</i>	.00	-.04	.03	.01	.01
<i>BMI</i>	-.07	-.10	.06	-.11	-.05
<i>Group</i> ³	-.14 [†]	-.23**	-.04	-.09	.01
<i>Vaginal</i>	.15	-.02	.10	.26*	.20 [†]
<i>Unplan. CS</i>	-.24*	-.28**	-.08	-.16	-.21 [†]
<i>PSS</i>	-.32**	-.47***	-.09	-.25*	-.07
<i>PRA</i>	-.05	.04	-.07	-.05	-.13
<i>PHQ</i>	-.03	.03	-.10	.02	-.01
<i>Total R²</i>	.35***	.37***	.12	.29***	.24**

* $p < .05$,

** $p < .01$,

*** $p < .001$,

[†] $p < .10$;

¹ Percent of U.S. poverty level;

² Multiparous coded as 0; primiparous coded as 1;

³ Control coded as 0; intervention coded as 1; MAMAS=Maternal Adiposity, Metabolism, and Stress; SEED=Stress, Eating, and Early Development; CEQ=Childbirth Experience Questionnaire, CS=cesarean section, PSS=Perceived Stress Scale, PRA=Pregnancy-related Anxiety, PHQ=Patient Health Questionnaire.