Title

Cognitive Behavioral Stress Management Effects on Prenatal Anxiety Among Low-Income Women

Journal

Journal of Consulting and Clinical Psychology, 90(2)

ISSN

0022-006X

Authors

Ponting, Carolyn
Chavira, Denise A
Schetter, Christine Dunkel
et al.

Publication Date

2022-02-01

DOI

10.1037/ccp0000699

Peer reviewed

HHS Public Access

Author manuscript

J Consult Clin Psychol. Author manuscript; available in PMC 2023 March 24.

Published in final edited form as:

J Consult Clin Psychol. 2022 February ; 90(2): 148–160. doi:10.1037/ccp0000699.

Cognitive Behavioral Stress Management Effects on Prenatal Anxiety Among Low-Income Women

Carolyn Ponting[1], **Denise A. Chavira**[1], **Christine Dunkel Schetter**[1], **Guido G. Urizar Jr**[2]

[1] Department of Psychology, University of California, Los Angeles

[2] Department of Psychology, California State University, Long Beach

Abstract

Objective: Few studies have tested cognitive behavioral therapy to reduce prenatal anxiety despite substantial empirical support among individuals seeking treatment for anxiety symptoms. We examined whether a brief cognitive behavioral intervention delivered to low-income pregnant women would be efficacious for reducing prenatal anxiety.

Method: A sample of 100 primarily ethnic and racial minority pregnant women with subclinical anxiety (74% Latina, 18% Black; M_{age} = 26.5) were randomized to an 8-week cognitive behavioral stress management (CBSM) intervention (n = 55), or to an attentional control condition (n = 45). Two forms of anxiety (state and pregnancy-specific) were measured at baseline, post-treatment, and at follow-up in the postpartum using the State–Trait Personality Inventory-State and the Pregnancy Related Anxiety scale, respectively. Intent-to-treat (ITT) and completer analyses were conducted using linear mixed models to test mean differences in both forms of anxiety by group assignment and by intervention completion (<7 vs. ≥7 sessions) at post-treatment and follow-up timepoints.

Results: ITT results revealed no intervention Group × Time interactions for state, $F(3, 356)$ = .51, p = .68, or pregnancy-specific anxiety, $F(2, 184.39)$ = .75, p = .47, indicating no intervention effect post-treatment or at follow-up. Completer analyses showed that women who received all intervention content (34.5%) had significantly less state anxiety at post-treatment compared to women who had not completed the intervention, (65.5%; $M_{sessions}$ = 3.62); F(6, 270.67) = 2.35, p = .03, and those in the control condition.

Conclusions: While we did not find support for the use of CBSM to treat prenatal anxiety among low-income women, those who received a full dose benefited in state anxiety immediately postintervention.

Correspondence concerning this article should be addressed to Carolyn Ponting, Department of Psychology, University of California, Los Angeles, 1183C Franz Hall, 502 Portola Plaza, Los Angeles, CA 90095, United States. cponting@ucla.edu.

The data reported in this manuscript were collected from 2011 to 2013. Findings from the data collected as part of this randomized controlled trial of a cognitive behavioral stress management intervention have been reported in separate manuscripts. Manuscript 1 (Urizar, Yim, et al., 2019) focuses on the intervention effects on perceived stress and maternal salivary cortisol variables, while Manuscript 2 (Urizar, Caliboso, et al., 2019) reports on the process evaluation of the intervention, including intervention delivery, receipt and enactment as well as participants' confidence in using intervention strategies.

Keywords

prenatal; anxiety; intervention; Latina; Black

Psychotherapy is the first line of treatment recommended by obstetricians and psychologists for women who have anxiety symptoms that interfere with functioning during pregnancy (Bandelow et al., 2014; Dayan & Yoshida, 2007). However, most treatment efficacy studies for anxious pregnant women focus on complementary and alternative therapies (e.g., yoga), and many are methodologically flawed (Matthews et al., 2017; Newham, 2014). A paucity of psychological intervention trials with anxious pregnant women (Nillni et al., 2018) leave obstetric and mental health providers with an evidence base primarily derived from research with nonpregnant samples, which may not translate to women with prenatal anxiety. For example, psychotherapies with clear efficacy for anxiety reduction in the general population, including cognitive behavioral therapy (CBT), exposure therapy (Deacon & Abramowitz, 2004), or acceptance and commitment therapy (Landy et al., 2015), have little to no causal research supporting their efficacy for prenatal anxiety (Arch et al., 2012; Nillni et al., 2018).

The absence of evidence-based clinical interventions for pregnant women is concerning, given that prenatal anxiety disorders are prevalent. An estimated 15.6% of women meet criteria for an anxiety disorder during pregnancy—making them more common than depressive disorders in the perinatal period (Fairbrother et al., 2016). Anxiety symptoms in pregnant women may also manifest as fears about pregnancy, described as *pregnancy-specific* anxiety (Guardino & Schetter, 2014). Pregnancy-specific anxiety is a type of anxiety not currently captured by The Ameican Psychiatric Association's diagnostic criteria (Sharma & Mazmanian, 2014). This category includes persistent worries during pregnancy relating to a woman's prenatal health, her delivery, the well-being of the baby, and future parenting, and is estimated to affect 14.4% of women (Poikkeus et al., 2006). Pregnancy-specific anxiety is conceptually and empirically distinct from general trait and state anxiety (Dunkel Schetter & Ponting, 2021), and also from clinical diagnoses, such as generalized anxiety disorder (Blackmore et al., 2016). For example, a recent study showed that state anxiety in the previous week only accounted for between 2% and 23% of the variance in pregnancy-specific anxiety across all trimesters (Anderson et al., 2019). Furthermore, the presence of distinctive worries, the time limited nature, and the unique outcomes (e.g., preterm birth) associated with pregnancy-specific anxiety have led researchers to consider it a distinct type of anxiety (Anderson et al., 2019).

Data show that ethnic and racial minority women have higher rates of prenatal anxiety than their non-Latina White counterparts. For example, findings from a British national survey on maternal health (n = 5,000) indicated that ethnic and racial minority women were over 1.5 times more likely to report feeling anxious during pregnancy than non-Latina White women (Henderson & Redshaw, 2013). Similarly, results from a survey of over 3,500 pregnant Canadian women showed that 28% of Latinas and 26% of Black women reported symptoms of state anxiety above a clinical cutoff, compared to 17% of non-Latina Whites (Robinson et al., 2016). Latinas and Black women (Guardino & Schetter, 2014) also show greater pregnancy-specific anxiety than their non-Latina White counterparts.

Research supports that the disproportionate burden of anxiety on Latinas and Black women is related to systemic and structural factors. Due to systemic racism and xenophobia, ethnic and racial minority women in the U.S. are disproportionately likely to encounter poverty (Tucker & Lowell, 2016). Financial context is important to consider given the higher rates of perinatal anxiety in low-income settings (Henderson & Redshaw, 2013) and the associated difficulties accessing insurance, housing, and transportation—social determinants related to worse prenatal care (Gadson et al., 2017). Ethnic and racial minority women are also more likely than their non-Latina white counterparts to encounter prenatal care providers whose lack of knowledge around their prenatal cultural practices or whose implicit biases (e.g., perception of patients as noncompliant) are distressing (Lieberman et al., 2020). This is substantiated by data, showing that Latinas and Black women rate interactions with providers in family planning (Dehlendorf et al., 2010) and prenatal care contexts (Novick, 2009) as unpleasant, discriminatory, or inadequate—experiences that increase odds of prenatal anxiety (Henderson & Redshaw, 2013). In the case of immigrant Latinas, traumatic migration experiences, including family separation (Lara-Cinisomo et al., 2019) and fears, related to deportation (Salas-Wright et al., 2015) further increase risk for anxiety. Thus, Latinas and Black women constitute a high-risk group for prenatal anxiety who stand to benefit from psychological interventions to reduce anxious symptomology.

Interventions that target prenatal state anxiety and pregnancy-specific anxiety may alleviate adverse outcomes for women during pregnancy and the postpartum. Both of these types of anxiety are associated with adverse health behaviors during pregnancy (e.g., alcohol use; Leis et al., 2012; Lobel et al., 2008), adverse birth outcomes, including preterm birth (Dunkel Schetter & Tanner, 2012) and low birthweight (Ding et al., 2014), and subsequent maternal anxiety after birth (Blackmore et al., 2016). Importantly, pregnancy-specific anxiety predicts shorter gestational age, lower birthweight, and generalized anxiety diagnoses after controlling for prenatal anxiety disorders, suggesting an independent effect on maternal physiology and psychopathology (Blackmore et al., 2016). Taken together, findings suggest that both state and pregnancy-specific anxiety have significant and unique effects on mental health and birth outcomes—making reduction of both types of anxiety a prenatal health priority.

Psychological interventions for prenatal anxiety—including state anxiety, pregnancy-specific anxiety, and their combination—are urgently needed, as currently, no intervention modality has sufficient evidence to be considered efficacious (Chambless & Ollendick, 2001). Though randomized controlled trials (RCTs) have examined therapies, such as mindfulness and CBT for state anxiety symptoms, sample sizes are small and intervention effects are inconsistent (Matvienko-Sikar et al., 2016; Newman et al., 2017). Psychological interventions that target pregnancy-specific anxiety are also lacking. In a recent systematic review of nonpharmacological interventions for pregnancy-specific anxiety (Stoll et al., 2018), the authors note that two of six RCTs tested the efficacy of manualized psychotherapies; both of these trials utilized a CBT approach. While one trial reported significantly reduced childbirth and related worries (outperforming a control condition; Saisto et al., 2001), the other trial did not (Bittner et al., 2014). It is possible that making time for treatment during a period of increased medical contact (Kim et al., 2010), and uncertainty about whether symptoms are due to hormonal changes (Kingston et al., 2015) deters pregnant women

from effectively engaging in CBT—leading to worse treatment outcomes than those reported in nonpregnant samples. Disparities in treatment outcomes for anxiety during pregnancy as compared to other points in women's lives, and the lack of data on evidence-based interventions for pregnancy specific anxiety, a distinct presentation of anxiety, underscore the need to examine the efficacy of CBT in pregnant women broadly.

Cognitive behavioral stress management (CBSM) is a cognitive behavioral intervention that effectively reduces anxious symptoms in adults, but remains untested for prenatal anxiety. CBSMs share several treatment targets with traditional CBT, including changing maladaptive thoughts and behaviors to reduce worry and tension. Initial evidence suggests that CBSM reduces anxiety symptoms in both clinical and "at risk" samples. For example, in treatment studies of women with preterm labor (Scherer et al., 2016) and generalized anxiety disorder (Asmaee Majid et al., 2012), participants randomized to CBSM showed that steeper declines in anxiety symptoms post-treatment compared to those in the control groups. CBSM can also be feasibly delivered to pregnant women (Urizar, Caliboso, et al., 2019), and ethnic and racial minorities (Lopez et al., 2013; Penedo et al., 2007). Moreover, CBSM has led to reductions in correlates of anxiety, such as stress and cortisol during pregnancy (Karamoozian & Ghasem, 2015; Urizar & Muñoz, 2011), findings replicated in the present CBSM trial, whose stress outcomes are reported in Urizar, Yim, et al. (2019).

CBSM also shows promise in the realm of acceptability, and preliminary findings suggest high consumer satisfaction among pregnant ethnic and racial minority samples (Urizar, Caliboso, et al., 2019). CBSM's emphasis on relaxation techniques to reduce physiological arousal is likely important for cultural fit given evidence that Latinx and Black Americans often express anxious distress somatically (Hunter & Schmidt, 2010; Lewis-Fernández et al., 2010). Furthermore, CBSM's normalizing language (i.e., "stress") and familiar strategies (e.g., relaxation and problem solving) reduce clinical jargon, which may increase the acceptability of an intervention with minority populations (Chavira et al., 2017). Improving acceptability of psychological interventions is critical for pregnant Latina and Black women living in the United States who report high mental health service utilization stigma (Ko et al., 2012; O'Mahen et al., 2011) and disproportionate treatment dropout (Cooper & Conklin, 2015).

Given the dearth of evidence-based interventions for prenatal anxiety and the elevated rates of anxiety symptoms among pregnant Latinas and Black women, examining the efficacy of a psychological intervention for prenatal anxiety outcomes in this group is warranted. Initial findings regarding CBSM's acceptability and effectiveness suggest that it may be a useful treatment option for pregnant women from ethnic and racial minority backgrounds (Urizar, Yim, et al., 2019). The goal of the present study was to examine prenatal anxiety outcomes among a community sample of ethnic and racial minority pregnant women following their randomization to either a CBSM intervention or a control group. We hypothesized that women randomized to the CBSM group would report lower state and pregnancy-specific anxiety at post-treatment compared to those in the control condition. We did not have a-priori hypotheses about whether anxiety reductions would last into follow-up timepoints given limited data on treatment maintenance during the perinatal period.

Method

Participants

Participants were 100 pregnant women (primarily Latina 70.3% and African American 17.8%) recruited from six prenatal centers in California, which serve low-income populations (Urizar, Caliboso, et al., 2019). Recruitment was achieved through referrals by health care providers and distribution of printed flyers, or in person contact by research staff in waiting rooms of prenatal clinics. Pregnant women were eligible if they were 18 years of age or older, less than 17-week pregnant, and fluent in English or Spanish. Though no cutoffs on anxiety, depression or stress were used to determine eligibility, women currently diagnosed with a mental health disorder (e.g., depression and anxiety), or significant medical concerns (e.g., gestational diabetes) per self-report were excluded. These exclusion criteria were important to the parent trial (see Urizar, Yim, et al., 2019), which sought to reduce stress among a community sample, of low-income women considered "at risk" for stress and anxiety because of a sociodemographic profile associated with various systemic stressors (e.g., Antoni et al., 2009). For additional information regarding study enrollment and randomization procedures, see Urizar, Yim, et al. (2019).

Design

Women were randomized to receive either the CBSM intervention (n = 55), or to an attentional control condition that received weekly prenatal health information sent by mail (n = 45). Women in the intervention and the attentional control groups received treatment, or the educational materials for 8 weeks. Women completed self-report measures of psychological distress, including stress (primary outcome of trial; Urizar, Yim, et al., 2019), depression and prenatal anxiety prior to treatment (i.e., baseline), following the 8-week intervention (i.e., post-treatment), at 30–32-week gestational age (i.e., third trimester follow-up), and 3-month postpartum. Participants received up to $200 in gift cards for completing all four study assessments. All study procedures were approved by the institutional review board at California State University, Long Beach (National Institutes of Health, Clinical Trial NCT03627247). Baseline characteristics of women randomized to each group can be found in Table 1; there were no statistically significant differences between groups.

Cognitive Behavioral Stress Management Program

The SMART Moms CBSM protocol is a manualized group-based CBT program created to teach women coping and relaxation skills for common prenatal stressors (e.g., concerns about their baby's health and financial stressors during pregnancy). The intervention combined and adapted materials from a CBT-based postpartum depression prevention intervention created for and tested with Latina and Black women (Muñoz et al., 2007; Tandon et al., 2014) and a cognitive behavioral stress management intervention for women with breast cancer (Antoni, 2003). In addition to surface-structure adaptations that served as an initial step towards improving cultural fit (i.e., using images of Latinas and Black women and Spanish language intervention protocol), the CBSM protocol also included deep-structure adaptations. For example, sessions provided body-based relaxation interventions —a common practice to reduce distress in Latinas and Black women (Burnett-Zeigler et al., 2016). The protocol also explained somatization as a common manifestation of stress

and encouraged discussion about the "pros and cons" of assertive communication in the context of cultural norms and social structures that might discourage this style of interaction in women of color. Clinically trained facilitators were bilingual, and some groups were conducted in Spanish, using translated intervention materials. The SMART Moms CBSM was delivered at a prenatal health clinic by two group facilitators over 8 weeks. Group sessions lasted 2 hr, were interactive, and ended with a homework assignment related to the coping and relaxation skills reviewed that week. The intervention covered topics, such as stress awareness, thought monitoring and restructuring, coping skills (i.e., problem focused vs. emotion focused), relaxation techniques (e.g., progressive muscle relaxation), social support, and assertive communication. For a complete description of the aims, strategies, and techniques covered by SMART Moms CBSM, see Urizar, Caliboso, et al. (2019).

Control Group

Women in the control condition were mailed printed prenatal health handouts from the "Becoming Mom" workbook from the March of Dimes Foundation (March of Dimes, 2011). Handouts provided information about prenatal well-being including common pregnancy discomforts, breastfeeding, and labor. Materials were sent once a week for 8 weeks, and a member of the research staff called participants to confirm that they had received and engaged with the material.

Measures

State Anxiety

A subscale of the State–Trait Personality Inventory (Spielberger et al.,1995) was used to measure self-reported state anxiety. The State and Trait Personality Inventory-State (STPI-S; Spielberger & Reheiser, 2009) is comprised of 10-items that measure the emotional state of anxiety in the moment. Example items include "I am worried" and "I feel tense." Each item is rated on a scale from 1 (*not at all*) to 4 (*very much so*) with higher scores indicating more anxiety. The STPI-S has been used and validated in pregnant populations (Woods-Giscombé et al., 2010) and its items are all derived from the State and Trait Anxiety Inventory (Spielberger et al.,1983), which has been used and validated with Spanish-speaking Latinas (Spielberger, 1971) and Black women (Williams et al., 2012). The STPI-S was administered at intervention baseline, immediately postintervention, at 30–32-week gestation, and 3-month postpartum. The Cronbach's α at each timepoint was .87, .85, .84, and .84, respectively.

Pregnancy-Specific Anxiety

The Pregnancy-Related Anxiety scale is a 10-item scale that assesses the frequency with which a pregnant woman feels concerned about their health, their baby's health, labor and delivery, or caring for a baby (Rini et al., 1999). Responses are made on a scale ranging from 1 (*not at all*) to 4 (*very much*), and a sum score from 4 to 40 is obtained, with higher scores indicating more pregnancy-specific anxiety. Sample items include: "I am worried that I will be harmed during delivery" and "I am fearful regarding the health of my baby." The measure shows good reliability and internal consistency in both English and Spanish, and has been used in community samples (Ramos et al., 2019) and clinical treatment studies (Urizar,

Caliboso, et al., 2019) with pregnant women. The Cronbach's α at baseline, post-treatment, and third trimester was .73, .74, and .85, respectively.

Treatment Group

Treatment group (i.e., CBSM vs. control group) was dummy coded with the control group serving as the reference group.

Treatment Completers

Women who attended at least seven of the eight sessions were considered to have received a full course of the intervention and are referred to hereafter as treatment completers. Women who attended seven sessions guaranteed that they were exposed to all parts of the intervention content (i.e., attended all sessions and missed the review or missed one session, but received some of the missed session content in the review session). Treatment completion was coded as a categorical variable (control condition = 0, noncompleter = 1, completer = 2) to be able to compare mean symptom differences across all three groups.

Covariates

Financial hardship and depressive symptoms measured at baseline were entered as covariates in all models given their associations with prenatal anxiety (Gurung et al., 2005; Heron et al., 2004). Ethnicity (i.e., Latina vs. non-Latina) was entered as a covariate of interest because of the dearth of evidence for prenatal intervention efficacy in this group (Ponting et al., 2020) and because the subgroups were large enough to compare. Finally, parity was included as a covariate in models examining pregnancy-specific anxiety outcomes due to findings indicating that first time mothers show greater pregnancy anxiety than mothers with prior birthing experience (Huizink et al., 2016).

Financial hardship was assessed by asking women "How hard was it living on your annual income this last year?" This item was dummy coded, such that women who responded "Hard" or "Somewhat hard" were compared against those who indicated "Not too hard" and "Not hard at all" (reference). Parity (nulliparous vs. multiparous) and ethnicity were also dummy coded (reference groups: nulliparous, non-Latina). Baseline depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). The EPDS is a 10-item self-report scale that assesses perinatal depression severity in the past week, validated in English (e.g., Murray & Carothers, 1990) and Spanish (Alvarado et al., 2015). The Cronbach's α in this study was .81.

Data Analytic Plan

CBSM Efficacy

We assessed efficacy of the CBSM intervention with respect to state anxiety and pregnancy-specific anxiety using separate models. Estimates of mean state anxiety and pregnancy-specific anxiety were calculated in the CBSM and control group at baseline, post-treatment, and third trimester follow-up, and again at 3-month postpartum for state anxiety using linear mixed models (LMM). Both prenatal anxiety LMM were fit with treatment condition (CBSM and control group) as the between subjects factor, time (pre-, post-intervention,

and third-trimester follow-up) as a within subjects factor and a group by time interaction. Subject-level random effects were used to account for within subject correlations. LMMs produce unbiased parameter estimates by allowing different numbers of observations per record, thus handling missing data missing at random, which allowed us to use all available data for all subjects irrespective of whether they had complete follow-up data (Figure 1). This intent-to-treat (ITT) analytical approach does not rely on additional ad hoc imputation techniques and preserves more statistical power than popular imputation approaches applied to longitudinal clinical trial data (e.g., last observation carried forward imputation methods; Chakraborty & Gu, 2019). Demographic (i.e., ethnicity, financial hardship, and parity) and clinical variables (i.e., baseline depressive symptoms) were added to these models as covariates.

Power analyses in the parent trial were conducted a-priori using G-Power (Erdfelder & Buchner, 1996), where a sample size of 100 women was sufficient to detect a medium intervention effect (d = .5) on perceived stress at .80 (Urizar, Yim, et al., 2019). Previous CBSM trials in nonclinical samples also have found effect sizes in the medium range for anxiety outcomes (see review by Crawford et al., 2013). Thus, the sample size for the present study was considered to be adequate to detect a medium effect size; however, a-priori power analyses specific to anxiety were not conducted.

Completer Analyses

In addition to comparing intervention efficacy by randomization group, we conducted follow-up analyses examining the efficacy of CBSM on state anxiety and pregnancy-specific anxiety for women who had received a full course of the intervention versus those who had not. Separate LMM with state and pregnancy-specific anxiety as outcomes were fit with treatment completion status (treatment completer, treatment noncompleter, and control) as the between subjects factor, time (pre-, postintervention, and third-trimester follow-up) as a within subjects factor, and a treatment completion status by time interaction. The same covariates described in the ITT models were included in the treatment completer models.

Results

Overall, women enrolled in the study towards the end of their first trimester (M = 9.91 weeks, SD = 4.24 weeks). Most had at least one child prior to the current pregnancy (62.4%; *Mode* = 2 children) and about half were single and not living with the baby's father (51.5%). Women generally reported low socioeconomic status; 75.2% reported a total family income of less than $20,000 per year before taxes, and just over a third of women completed high school or a general education development diploma; GED (34.7%), though 36% reported leaving school before high school completion. Women were 26.5 years old on average (SD = .9), and primarily unemployed at the time of their first interview (70.3%). For additional demographic information, as well as mean scores for anxiety and depression, see Table 1.

CBSM Efficacy

Results of the LMM revealed no main effect of intervention group or time on state anxiety, indicating that mean state anxiety did not differ based on intervention group or

timepoint (i.e., baseline to 3-month postpartum follow-up). Furthermore, the interaction between intervention group and time was not significant, indicating no between group (i.e., intervention vs. control) differences in mean state anxiety over time from baseline to third trimester follow-up. Regarding covariates, there was a significant main effect of baseline depression, $F(1, 361) = 150.54$, $p < .001$. Examination of the simple effects indicated that on average, women with greater baseline depressive symptoms, $\beta = .58$, $SE = .05$, $p = <.001$, 95% CI [.49, −.67], reported greater state anxiety.

Results of the LMM analyses revealed no main effect of intervention group or time on pregnancy-specific anxiety. Furthermore, the interaction between intervention group and time was not significant indicating no between group (i.e., intervention vs. control) differences in mean pregnancy-specific anxiety baseline to third-trimester follow-up. Regarding covariates, there was a significant main effect of baseline depression, $F(1, 95.81) = 30.82$, $p < .001$, and parity, $F(1, 94.27) = 12.74$, $p = .001$. Examination of the simple effects indicated that on average nulliparous women, $\beta = 2.65$, $SE = .74$, $p = .001$, 95% CI [1.18, 4.13], and women with greater baseline depressive symptoms, $\beta = .35$, SE = .06, $p = <.001$, 95% CI [.22, .47], reported greater pregnancy-specific anxiety.

See Table 2 for the tests of fixed effects for LMM for and state and pregnancy-specific anxiety. For the estimated marginal mean values for state and pregnancy-specific anxiety from baseline to 3-month postpartum follow-up, see Table 3.

Characteristics of Treatment Completers

Of the 55 women randomized to the treatment group, just over a third ($n = 19$) were considered treatment completers. Consistent with the demographics of the larger sample, most women were Latina (68%), preferred to speak Spanish (58%), had attained a high school education or less (79%), and disclosed financial hardship (58%). About half (53%) of the women who completed the intervention were U.S. born, a proportion not significantly different from the proportion of U.S. born women in the larger study. Of the demographic and clinical variables measured, the only significant difference between completers and noncompleters was that noncompleters reported higher depressive symptoms, $t(42.15) = 2.47$, $p = .018$, at baseline.

Completer Analyses

Results of the LMM analyses revealed no main effect of intervention completion or time on state anxiety, indicating that mean state anxiety did not differ based on completion status or timepoint (i.e., baseline to 3-month postpartum). However, the interaction between intervention completion and time was significant, $F(6, 270.67) = 2.35$, $p = .032$, indicating that there were group differences in state anxiety by timepoint. Examination of the simple effects indicated that at post-treatment, the CBSM completers showed significantly lower mean state anxiety, $\beta = -5.06$, $SE = 1.71$, $p = .003$, 95% CI [−8.42, −1.70], than women in the control condition. CBSM noncompleters did not differ from the control condition on mean state anxiety at post-treatment. At third-trimester follow-up, and at 3-month postpartum, mean state anxiety was no longer significantly different between completers, noncompleters, or the control group. Regarding covariates, there was a significant main

effect of baseline depressive symptoms, $F(1, 92.42) = 87.53$, $p < .001$. Examination of the simple effects indicated that on average, women with greater baseline depressive symptoms, β = .58, SE = .06, $p \leq .001$, 95% CI [.46, .71], reported greater state anxiety.

Results of the LMM analyses revealed no main effect of intervention completion or time on pregnancy-specific anxiety. The interaction between completion status and time was also not significant indicating no between group (i.e., completer vs. noncompleter or control) differences in mean pregnancy specific anxiety from baseline to third-trimester follow-up. Regarding covariates, there was a significant main effect of parity, $F(1, 93.21) = 12.84$, $p = .001$, and baseline depression, $F(1, 94.31) = 30.99$, $p < .001$. Examination of the simple effects indicated that on average, nulliparous women, β = 2.68, $SE = .75$, $p = .001$, 95% CI [1.19, 4.16], and women with greater baseline depressive symptoms, β = .36, $SE = .06$, $p \leq .001$, 95% CI [.23, .48], reported greater pregnancy-specific anxiety. For the estimated marginal mean values for state and pregnancy-specific anxiety from baseline to three-month postpartum follow-up, see Table 4.

Discussion

This is the first RCT to test a cognitive behavioral intervention to reduce prenatal anxiety with a sample of low-income ethnic and racial minority pregnant women. Although this CBSM intervention was delivered with high fidelity, and participants reported good understanding of intervention content (Urizar, Caliboso, et al., 2019), stringently controlled longitudinal analyses suggest that women randomized to the CBSM group did not differ significantly from those in the control condition on state or pregnancy-specific anxiety at any post-treatment assessment. Findings from this study suggest that in its current form, CBSM may not be efficacious for prenatal anxiety in a nonclinical sample of low-income Latinas and Black women.

In studies with primarily non-Latina White women, CBT-based interventions examined during pregnancy have also lacked efficacy for state (Austin et al., 2008; Bittner et al., 2014) and pregnancy-specific anxiety (Bittner et al., 2014). Findings with ethnic and racial minority women mirror the state of the literature among non-Latina White women (Nillni et al., 2018). In fact, a recent systematic review found that there are currently no efficacious psychological interventions—including CBT—for prenatal anxiety in samples with significant representation of Latinas and Black women (Ponting et al., 2020). It is unclear whether CBT interventions—including this CBSM—are considered culturally congruent for pregnant ethnic and racial minority women. For example, certain cultural values that uplift maternal self-sacrifice (i.e., marianismo; Lara-Cinisomo & Wisner, 2013) may initially appear mismatched to a model of treatment that asks women to recruit help from others to reduce stress and anxiety. Future work can consider how cultural conceptions of the maternal role interact with acceptability and engagement with CBT to improve care and implement deeper level—and more resonant—cultural adaptations. Investigators can also improve their understanding of local cultural norms and implementation contexts (e.g., hospitals and community centers) by involving stakeholders from the beginning of intervention development to think creatively about addressing structural barriers (e.g., transportation) that may limit optimal participation. Notwith-standing, given the widespread

empirical support for CBT for treating anxiety in ethnic and racial minority adults (Carter et al., 2012), and that existing trials with pregnant women are limited, additional research is needed to understand whether CBT can be a viable treatment option for anxious ethnic and racial minority pregnant women.

In fact, there were intervention components likely important for prenatal anxiety reduction that prior CBT trials for prenatal anxiety (Austin et al., 2008; Bittner et al., 2014) and the present study's CBSM intervention did not include. For example, the absence of exposure in CBSM, a behavioral component of other CBTs for anxiety, might have reduced intervention effects for both state and pregnancy-specific anxiety. Researchers have suggested that exposure to (a) birthing videos (in vivo), (b) prior delivery experiences or future concerns about delivery and parenting (imaginally), and (c) bodily sensations (interoceptive), may be fast acting and potent interventions for both pregnancy-specific anxiety (Stoll et al., 2018) and more generalized prenatal anxiety (Arch et al., 2012). It is also possible that the inclusion of prenatal health education would have increased intervention potency. Though the control condition received educational prenatal health information via mail, the CBSM intervention did not incorporate this content. Prenatal health education has been linked to reductions in pregnancy-specific anxiety as a stand-alone intervention in other studies (Madhavanprabhakaran et al., 2016), and may help women manage pregnancy-related uncertainties (Yuvaci et al., 2020).

Another possibility is that CBSM would have been sufficient if optimally engaged. In fact, results were more promising for women who completed the 8-week CBSM intervention. Treatment completers showed significant reductions in state anxiety at post-treatment, a finding that is novel among ethnic/racial minority pregnant women. It is encouraging that at least in the short term, this cognitive behavioral program focused on stress reduction was effective. However, pregnancy-specific anxiety remained unchanged among completers —lending support to conceptual models of pregnancy distress which consider pregnancy-specific anxiety to be distinct from generalized anxiety symptoms (Blackmore et al., 2016), working through different pathways (Dunkel Schetter, 2011). Pregnancy-specific worries may be better targeted by prenatal health programs, such as Centering Pregnancy—which focus on labor and delivery, nutrition, and common pregnancy stressors, and are linked to better maternal mental health and birthing confidence among ethnic and racial minority women (Benediktsson et al., 2013).

While a full course of CBSM may be efficacious in reducing state anxiety for pregnant women, these findings are qualified by the fact that improvements were not maintained at follow-up. Moreover, in line with substantial data identifying depression as a robust predictor of premature dropout in CBTs (Fernandez et al., 2015), women with greater baseline depressive symptoms were less likely to complete the intervention, and thus showed less favorable state anxiety outcomes post-treatment. Many intervention components in CBSM—thought monitoring and challenging, improving social support, assertiveness training—show benefit for both depression and anxiety (Dour et al., 2014; Driessen & Hollon, 2010; Speed et al., 2017). Women in the present trial were first taught thought monitoring and challenging; however, beginning with content to improve social support may improve depressive symptoms more quickly and increase the perceived relevance of CBSM.

In fact, for ethnic and racial minority pregnant women, relationship conflict is among the strongest predictors of prenatal depressive symptoms (Westdahl et al., 2007). Other alternatives to engage women with elevated depression include incorporating structured problem solving to pre-empt treatment barriers (Titov et al., 2011) following randomization.

Though the majority of randomized trials for prenatal anxiety do not measure anxiety or distress at follow-up timepoints (Evans et al., 2018), when they do, increases in the postpartum are common (e.g., Guardino et al., 2014; Lönnberg et al., 2020). Rebound effects are not specific to the perinatal period. About half of adults treated for anxiety experience relapse (Delgadillo et al., 2018)—most within the first 6- month post-treatment (Ali et al., 2017). Nonetheless, using relapse-prevention techniques in trials for women transitioning to parenthood may be particularly relevant. Saxbe et al. (2018) argue that changes in biological (i.e., stress hormones and brain structure) and social (e.g., shifts in self-concept and daily routines) processes put women in the perinatal period at increased risk for adverse psychological outcomes. Saxbe et al. (2018) note that low-income women are particularly vulnerable to internalizing symptoms in the postpartum due to structural inequities (e.g., family leave policies) that are associated with increased stress. Taken together, these findings underscore the need to examine innovative strategies for sustained engagement post-treatment (e.g., booster sessions and text message check-ins; Malins et al., 2020) for low-income women receiving psychotherapy prenatally to reduce the chance of relapse.

This RCT has several strengths, including the recruitment and retention of low-income ethnic and racial minority women in their first trimester, and the longitudinal examination of treatment effects controlling for conceptually relevant variables. Moreover, the examination of both state anxiety and pregnancy-specific anxiety in a RCT is novel. Nevertheless, there are notable limitations. It is possible that we were unable to detect group differences due to sample size. There were 100 participants in this study, comparable to at least two other CBSM trials tested with adults with subclinical anxiety, whose sample sizes were sufficient to detect medium intervention effects (for review, see, Crawford et al., 2013). However, effect sizes during pregnancy may be smaller because of normative increases in anxiety in the third trimester and early postpartum (Dennis et al., 2017) as labor approaches and parenting begins. In fact, anxiety prevention trials testing cognitive behavioral treatments with non-Latinx white pregnant women, while beneficial, show smaller effect sizes (Austin et al., 2008; Missler et al., 2021) than those conducted with nonpregnant women (Mollarahimi Maleki et al., 2020). In addition, our findings do not rule out the possibility that CBSM is likely to show more robust effects in samples with similar enrollment numbers who are more severely anxious, as has been seen in other CBT trials during the prenatal period (Bittner et al., 2014). Finally, our understanding of the clinical significance of the anxiety reductions observed is limited. Our outcome measures, though common in perinatal intervention science, do not have clinical cutoffs. Moving forward, RCTs conducted with pregnant women “at-risk” for prenatal distress should aim to recruit larger sample sizes and utilize brief measures with established cutoffs to better detect and interpret meaningful changes in anxiety among women without clinical diagnoses.

The SMART Moms CBSM is a cognitive behavioral group intervention delivered in English and Spanish to pregnant Latinas and non-Latina Black women who were also low income. Findings from the parent trial show that CBSM may be a promising intervention for prenatal stress among women with mostly low or moderate levels of stress (Urizar, Yim, et al., 2019). In contrast, in the present study, we found that CBSM did not reduce prenatal anxiety in this nonclinical sample. However, the benefit seen by treatment completers immediately post-treatment suggests that future work should examine factors associated with intervention engagement to improve prenatal anxiety outcomes among community samples. Furthermore, studying the optimal use of booster sessions (i.e., at what point during pregnancy, how many) appears warranted to extend intervention effects into the postpartum when changing biopsychosocial processes put women at increased risk for psychological distress. Growing the evidence base of interventions for ethnic and racial minority women with prenatal anxiety, clinical and subclinical, is imperative given that both presentations have been associated with unfavorable birth and maternal mental health outcomes (Dunkel Schetter et al., 2021; Nakić Radoš et al., 2018). Continuing to test second- and third-wave cognitive behavioral interventions, considered widely efficacious during other developmental periods, ought to be part of this effort.

Acknowledgments

We gratefully acknowledge the funding from the National Institute of Child Health and Human Development (SC2 HD068878; Guido G. Urizar Jr.), and the National Institute of Mental Health (5T32 MH015750–38; Christine Dunkel Schetter).

References

Ali S, Rhodes L, Moreea O, McMillan D, Gilbody S, Leach C, Lucock M, Lutz W, & Delgadillo J (2017). How durable is the effect of low intensity CBT for depression and anxiety? Remission and relapse in a longitudinal cohort study. Behaviour Research and Therapy, 94, 1–8. 10.1016/j.brat.2017.04.006 [PubMed: 28437680]

Alvarado R, Jadresic E, Guajardo V, & Rojas G (2015). First validation of a Spanish-translated version of the Edinburgh postnatal depression scale (EPDS) for use in pregnant women: A Chilean study. Archives of Women's Mental Health, 18(6), 607–612. 10.1007/s00737-014-0466-z

Anderson CM, Brunton RJ, & Dryer R (2019). Pregnancy-related anxiety: Re-examining its distinctiveness. Australian Psychologist, 54(2), 132–142. 10.1111/ap.12365

Antoni MH (2003). Stress management intervention for women with breast cancer. American Psychological Association. 10.1037/10488-000

Antoni MH, Lechner S, Diaz A, Vargas S, Holley H, Phillips K, McGregor B, Carver CS, & Blomberg B (2009). Cognitive behavioral stress management effects on psychosocial and physiological adaptation in women undergoing treatment for breast cancer. Brain, Behavior, and Immunity, 23(5), 580–591. 10.1016/j.bbi.2008.09.005 [PubMed: 18835434]

Arch JJ, Dimidjian S, & Chessick C (2012). Are exposure-based cognitive behavioral therapies safe during pregnancy? Archives of Women's Mental Health, 15(6), 445–457. 10.1007/s00737-012-0308-9

Asmaee Majid S, Seghatoleslam T, Homan H, Akhvast A, & Habil H (2012). Effect of mindfulness based stress management on reduction of generalized anxiety disorder. Iranian Journal of Public Health, 41(10), 24–28.

Austin M-P, Frilingos M, Lumley J, Hadzi-Pavlovic D, Roncolato W, Acland S, Saint K, Segal N, & Parker G (2008). Brief antenatal cognitive behaviour therapy group intervention for the prevention of postnatal depression and anxiety: A randomised controlled trial. Journal of Affective Disorders, 105(1–3), 35–44. 10.1016/j.jad.2007.04.001 [PubMed: 17490753]

Bandelow B, Lichte T, Rudolf S, Wiltink J, & Beutel ME (2014). The diagnosis of and treatment recommendations for anxiety disorders. Deutsches Ärzteblatt International, 111(27–28), 473–480. 10.3238/arztebl.2014.0473 [PubMed: 25138725]

Benediktsson I, McDonald SW, Vekved M, McNeil DA, Dolan SM, & Tough SC (2013). Comparing centering pregnancy® to standard prenatal care plus prenatal education. BMC Pregnancy and Childbirth, 13(S1), Article 92. 10.1186/1471-2393-13-s1-s5

Bittner A, Peukert J, Zimmermann C, Junge-Hoffmeister J, Parker LS, Stöbel-Richter Y, & Weidner K (2014). Early intervention in pregnant women with elevated anxiety and depressive symptoms: Efficacy of a cognitive-behavioral group program. The Journal of Perinatal & Neonatal Nursing, 28(3), 185–195. 10.1097/JPN.0000000000000027 [PubMed: 25062520]

Blackmore ER, Gustafsson H, Gilchrist M, Wyman C, & G O'Connor T (2016). Pregnancy-related anxiety: Evidence of distinct clinical significance from a prospective longitudinal study. Journal of Affective Disorders, 197, 251–258. 10.1016/j.jad.2016.03.008 [PubMed: 26999549]

Burnett-Zeigler I, Schuette S, Victorson D, & Wisner KL (2016). Mind-body approaches to treating mental health symptoms among disadvantaged populations: A comprehensive review. The Journal of Alternative and Complementary Medicine 22(2), 115–124. 10.1089/acm.2015.0038 [PubMed: 26540645]

Carter MM, Mitchell FE, & Sbrocco T (2012).Treating ethnic minority adults with anxiety disorders: Current status and future recommendations. Journal of Anxiety Disorders, 26(4), 488–501. 10.1016/j.janxdis.2012.02.002 [PubMed: 22417877]

Chakraborty H, & Gu H (2019). A mixed model approach for intent-to-treat analysis in longitudinal clinical trials with missing values. RTI Press.

Chambless DL, & Ollendick TH (2001). Empirically supported psychological interventions: Controversies and evidence. Annual Review of Psychology, 52(1), 685–716. 10.1146/annurev.psych.52.1.685

Chavira DA, Bustos CE, Garcia MS, Ng B, & Camacho A (2017). Delivering CBT to rural Latino children with anxiety disorders: A qualitative study. Community Mental Health Journal, 53(1), 53–61. 10.1007/s10597-015-9903-3 [PubMed: 26119534]

Cooper AA, & Conklin LR (2015, August 1). Dropout from individual psychotherapy for major depression: A meta-analysis of randomized clinical trials. Clinical Psychology Review. Elsevier Inc. 10.1016/j.cpr.2015.05.001

Cox JL, Holden JM, & Sagovsky R (1987). Edinburgh Postnatal Depression Scale (EPDS). The British Journal of Psychiatry, 150(6), 782–786. 10.1192/bjp.150.6.782 [PubMed: 3651732]

Crawford C, Wallerstedt DB, Khorsan R, Clausen SS, Jonas WB, & Walter JAG (2013). A systematic review of biopsychosocial training programs for the self-management of emotional stress: Potential applications for the military. Evidence-Based Complementary and Alternative Medicine, 2013(6), Article 747694. 10.1155/2013/747694

Dayan J, & Yoshida K (2007). Thérapeutique des troubles anxieux et dépressifs de la grossesse et du post-partum. Revue et synthèse. Journal de Gynecologie, Obstetrique et Biologie de la Reproduction, 36(6), 530–548. 10.1016/j.jgyn.2007.06.004 [PubMed: 17616265]

Deacon BJ, & Abramowitz JS (2004). Cognitive and behavioral treatments for anxiety disorders: A review of meta-analytic findings. Journal of Clinical Psychology, 60(4), 429–441. 10.1002/jclp.10255 [PubMed: 15022272]

Dehlendorf C, Rodriguez MI, Levy K, Borrero S, & Steinauer J (2010). Disparities in family planning. American Journal of Obstetrics and Gynecology, 202(3), 214–220. 10.1016/j.ajog.2009.08.022 [PubMed: 20207237]

Delgadillo J, Rhodes L, Moreea O, McMillan D, Gilbody S, Leach C, Lucock M, Lutz W, & Ali S (2018). Relapse and recurrence of common mental health problems after low intensity cognitive behavioural therapy: The WYLOW longitudinal cohort study. Psychotherapy and Psychosomatics, 87(2), 116–117. 10.1159/000485386 [PubMed: 29462816]

Dennis CL, Falah-Hassani K, & Shiri R (2017). Prevalence of antenatal and postnatal anxiety: Systematic review and meta-analysis. British Journal of Psychiatry, 210(5), 315–323. 10.1192/bjp.bp.116.187179

Ding XX, Wu YL, Xu SJ, Zhu RP, Jia XM, Zhang SF, Huang K, Zhu P, Hao J-H, & Tao FB (2014). Maternal anxiety during pregnancy and adverse birth outcomes: A systematic review and meta-analysis of prospective cohort studies. Journal of Affective Disorders, 159, 103–110. 10.1016/j.jad.2014.02.027 [PubMed: 24679397]

Dour HJ, Wiley JF, Roy-Byrne P, Stein MB, Sullivan G, Sherbourne CD, Bystritsky A, Rose RD, & Craske MG (2014). Perceived social support mediates anxiety and depressive symptom changes following primary care intervention. Depression and Anxiety, 31(5), 436–442. 10.1002/da.22216 [PubMed: 24338947]

Driessen E, & Hollon SD (2010). Cognitive behavioral therapy for mood disorders: Efficacy, moderators and mediators. The Psychiatric Clinics of North America, 33(3), 537–555. 10.1016/j.psc.2010.04.005 [PubMed: 20599132]

Dunkel Schetter C (2011). Psychological science on pregnancy: Stress processes, biopsychosocial models, and emerging research issues. Annual Review of Psychology, 62(1), 531–558. 10.1146/annurev.psych.031809.130727

Dunkel Schetter C, Julian M, & Ponting C (2021). Pregnancy-related anxiety and birth outcomes. Pregnancy-related anxiety: Theory, research, and practice. Routledge Publishers. 10.4324/9781003014003-3

Dunkel Schetter C, & Ponting C (2021). What is pregnancy-related anxiety? In Dyer R & Brunton RJ (Eds.), Pregnancy-related anxiety: Research, Theory and Practice. Routledge Publishers. 10.4324/9781003014003-7

Dunkel Schetter C, & Tanner L (2012). Anxiety, depression and stress in pregnancy: Implications for mothers, children, research, and practice. Current Opinion in Psychiatry, 25(2), 141–148. 10.1097/YCO.0b013e3283503680 [PubMed: 22262028]

Erdfelder E, & Buchner A (1996). GPOWER: A general power analysis program. Behavior Research Methods, Instruments, & Computers, 28(1), 1–11. 10.3758/BF03203630

Evans K, Morrell CJ, & Spiby H (2018). Systematic review and meta-analysis of non-pharmacological interventions to reduce the symptoms of mild to moderate anxiety in pregnant women. Journal of Advanced Nursing, 74(2), 289–309. 10.1111/jan.13456 [PubMed: 28921612]

Fairbrother N, Janssen P, Antony MM, Tucker E, & Young AH (2016). Perinatal anxiety disorder prevalence and incidence. Journal of Affective Disorders, 200(8), 148–155. 10.1016/j.jad.2015.12.082 [PubMed: 27131505]

Fernandez E, Salem D, Swift JK, & Ramtahal N (2015). Meta-analysis of dropout from cognitive behavioral therapy: Magnitude, timing, and moderators. Journal of Consulting and Clinical Psychology, 83(6), 1108–1122. 10.1037/ccp0000044 [PubMed: 26302248]

Gadson A, Akpovi E, & Mehta PK (2017). Exploring the social determinants of racial/ethnic disparities in prenatal care utilization and maternal outcome. Seminars in Perinatology, 41(5), 308–317. 10.1053/j.semperi.2017.04.008 [PubMed: 28625554]

Guardino CM, Dunkel Schetter C, Bower JE, Lu MC, & Smalley SL (2014). Randomised controlled pilot trial of mindfulness training for stress reduction during pregnancy. Psychology & Health, 29(3), 334–349. 10.1080/08870446.2013.852670 [PubMed: 24180264]

Guardino CM, & Schetter CD (2014). Understanding pregnancy anxiety: Concepts, correlates, and consequences. Zero to Three, 34(4), 12–21.

Gurung RAR, Dunkel-Schetter C, Collins N, Rini C, & Hobel CJ (2005). Psychosocial predictors of prenatal anxiety. Journal of Social and Clinical Psychology, 24(4), 497–519. 10.1521/jscp.2005.24.4.497

Henderson J, & Redshaw M (2013). Anxiety in the perinatal period: Antenatal and postnatal influences and women's experience of care. Journal of Reproductive and Infant Psychology, 31(5), 465–478. 10.1080/02646838.2013.835037

Heron J, O'Connor TG, Evans J, Golding J, & Glover V, & the ALSPAC Study Team. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. Journal of Affective Disorders, 80(1), 65–73. 10.1016/j.jad.2003.08.004 [PubMed: 15094259]

Huizink AC, Delforterie MJ, Scheinin NM, Tolvanen M, Karlsson L, & Karlsson H (2016). Adaption of pregnancy anxiety questionnaire-revised for all pregnant women regardless of parity: PRAQ-R2. Archives of Women's Mental Health, 19(1), 125–132. 10.1007/s00737-015-0531-2

Hunter LR, & Schmidt NB (2010). Anxiety psychopathology in African American adults: Literature review and development of an empirically informed sociocultural model. Psychological Bulletin, 136(2), 211–235. 10.1037/a0018133 [PubMed: 20192561]

Karamoozian M, & Ghasem A (2015). Impact of prenatal cognitive-behavioral stress management intervention on maternal anxiety and depression and newborns' Apgar scores. Iranian Journal of Neonatology, 6(2), 14–23. 10.22038/IJN.2015.4485

Kim JJ, La Porte LM, Corcoran M, Magasi S, Batza J, & Silver RK (2010). Barriers to mental health treatment among obstetric patients at risk for depression. American Journal of Obstetrics and Gynecology, 202(3), 312.e1–312.e5. 10.1016/j.ajog.2010.01.004

Kingston D, Austin M-P, Heaman M, McDonald S, Lasiuk G, Sword W, Giallo R, Hegadoren K, Vermeyden L, van Zanten SV, Kingston J, Jarema K, & Biringer A (2015). Barriers and facilitators of mental health screening in pregnancy. Journal of Affective Disorders, 186, 350–357. 10.1016/j.jad.2015.06.029 [PubMed: 26281038]

Ko JY, Farr SL, Dietz PM, & Robbins CL (2012). Depression and treatment among U.S. pregnant and nonpregnant women of reproductive age, 2005–2009. Journal of Women's Health, 21(8), 830–836. 10.1089/jwh.2011.3466

Landy LN, Schneider RL, & Arch JJ (2015). Acceptance and commitment therapy for the treatment of anxiety disorders: A concise review. Current Opinion in Psychology, 2, 70–74. 10.1016/j.copsyc.2014.11.004

Lara-Cinisomo S, Fujimoto EM, Oksas C, Jian Y, & Gharheeb A (2019). Pilot study exploring migration experiences and perinatal depressive and anxiety symptoms in immigrant Latinas. Maternal and Child Health Journal 2019 23:12, 23(12), 1627–1647. 10.1007/S10995-019-02800-W [PubMed: 31264094]

Lara-Cinisomo S, & Wisner KL (Eds.). (2013). Perinatal depression among Spanish-speaking and Latin American women a global perspective on detection and treatment. Springer Science & Business Media. 10.1007/978-1-4614-8045-7

Leis JA, Heron J, Stuart EA, & Mendelson T (2012). Associations between depressive and anxious symptoms and prenatal alcohol use. Maternal and Child Health Journal, 16(6), 1304–1311. 10.1007/s10995-011-0892-8 [PubMed: 21971680]

Lewis-Fernández R, Hinton DE, Laria AJ, Patterson EH, Hofmann SG, Craske MG, Stein DJ, Asnaani A, & Liao B (2010). Culture and the anxiety disorders: Recommendations for DSM-V. Depression and Anxiety, 27(2), 212–229. 10.1002/da.20647 [PubMed: 20037918]

Lieberman AF, Diaz MA, Castro G, & Bucio GO (2020). Make room for baby: Perinatal child-parent psychotherapy to repair trauma and promote attachment. Guilford Publications.

Lobel M, Cannella DL, Graham JE, DeVincent C, Schneider J, & Meyer BA (2008). Pregnancy-specific stress, prenatal health behaviors, and birth outcomes. Health Psychology, 27(5), 604–615. 10.1037/a0013242 [PubMed: 18823187]

Lönnberg G, Jonas W, Bränström R, Nissen E, & Niemi M (2020). Long-term effects of a mindfulness-based childbirth and parenting program-a randomized controlled trial. Mindfulness. Advance online publication. 10.1007/s12671-020-01403-9

Lopez CR, Antoni MH, Seay J, Potter J, O'Sullivan MJ, Fletcher MA, Pereira D, & Whitehead N, (2013). Stress management, depression and immune status in lower income racial/ethnic minority women coinfected with HIV and HPV. Journal of Applied Biobehavioral Research, 18(1), 37–57. 10.1111/jabr.12003 [PubMed: 23526866]

Madhavanprabhakaran G, Sheila D'Souza M, & Nairy K (2016). Effectiveness of childbirth education on nulliparous women's knowledge of childbirth preparation, pregnancy anxiety and pregnancy outcomes. Nursing and Midwifery Studies. Advance online publication. 10.5812/nmsjournal.32526

Malins S, Biswas S, Patel S, Levene J, Moghaddam N, & Morriss R (2020). Preventing relapse with personalized smart-messaging after cognitive behavioural therapy: A proof-of-concept evaluation. British Journal of Clinical Psychology, 59(2), 241–259. 10.1111/bjc.12244 [PubMed: 31960467]

March of Dimes. (2011). Becoming a mom. March of Dimes Foundation.

Matthews J, Huberty JL, Leiferman JA, McClain D, & Larkey LK (2017). Perceptions, uses of, and interests in complementary health care approaches in depressed pregnant women: The

PAW survey. Journal of Evidence-Based Complementary & Alternative Medicine, 22(1), 81–95. 10.1177/2156587216641829 [PubMed: 27071640]

Matvienko-Sikar K, Lee L, Murphy G, & Murphy L (2016). The effects of mindfulness interventions on prenatal well-being: A systematic review. Psychology & Health, 31(12), 1415–1434. 10.1080/08870446.2016.1220557 [PubMed: 27539908]

Missler M, Donker T, Beijers R, Ciharova M, Moyse C, de Vries R, Denissen J, & van Straten A (2021). Universal prevention of distress aimed at pregnant women: A systematic review and meta-analysis of psychological interventions. BMC Pregnancy and Childbirth, 21(1), Article 276. 10.1186/s12884-021-03752-2

Mollarahimi Maleki F, Massahikhaleghi P, Tehrani-Banihashemi A, Davoudi F, & Nojomi M (2020). Community-based preventive interventions for depression and anxiety in women. Archives of Iranian Medicine, 23(3), 197–206. [PubMed: 32126789]

Muñoz RF, Le HN, Ippen CG, Diaz MA, Urizar GG, Soto J, Mendelson T, Delucchi K, & Lieberman AF (2007). Prevention of postpartum depression in low-income women: development of the Mamás y Bebés/mothers and babies course. Cognitive and Behavioral Practice. Advance online publication. 10.1016/j.cbpra.2006.04.021

Murray L, & Carothers AD (1990). The validation of the Edinburgh Postnatal Depression Scale on a community sample. The British Journal of Psychiatry, 157(2), 288–290. 10.1192/bjp.157.2.288 [PubMed: 2224383]

Nakić Radoš S, Tadinac M, & Herman R (2018). Anxiety during pregnancy and postpartum: course, predictors and comorbidity with postpartum depression. Acta Clinica Croatica, 57(1), 39–51. 10.20471/acc.2018.57.01.05 [PubMed: 30256010]

Newham J (2014). Complementary therapies in pregnancy: A means to reduce ill health and improve well-being? Journal of Reproductive and Infant Psychology, 32(3), 211–213. 10.1080/02646838.2014.924228

Newman L, Judd F, & Komiti A (2017). Developmental implications of maternal antenatal anxiety mechanisms and approaches to intervention. Translational Developmental Psychiatry, 5(1), Article 1309879. 10.1080/20017022.2017.1309879

Nillni YI, Mehralizade A, Mayer L, & Milanovic S (2018). Treatment of depression, anxiety, and trauma-related disorders during the perinatal period: A systematic review. Clinical Psychology Review, 66(3), 136–148. 10.1016/j.cpr.2018.06.004 [PubMed: 29935979]

Novick G (2009). Women's experience of prenatal care: An integrative review. Journal of Midwifery & Women's Health, 54(3), 226–237. 10.1016/j.jmwh.2009.02.003

O'Mahen HA, Henshaw E, Jones JM, & Flynn HA (2011). Stigma and depression during pregnancy: Does race matter? Journal of Nervous and Mental Disease, 199(4), 257–262. 10.1097/NMD.0b013e3182125b82 [PubMed: 21451350]

Penedo FJ, Traeger L, Dahn J, Molton I, Gonzalez JS, Schneiderman N, & Antoni MH (2007). Cognitive behavioral stress management intervention improves quality of life in Spanish monolingual hispanic men treated for localized prostate cancer: Results of a randomized controlled trial. International Journal of Behavioral Medicine, 14(3), 164–172. 10.1007/BF03000188 [PubMed: 18062059]

Poikkeus P, Saisto T, Unkila-Kallio L, Punamaki RL, Repokari L, Vilska S, Tiitinen A, & Tulppala M (2006). Fear of childbirth and pregnancy-related anxiety in women conceiving with assisted reproduction. Obstetrics and Gynecology, 108(1), 70–76. 10.1097/01.AOG.0000222902.37120.2f [PubMed: 16816058]

Ponting C, Mahrer NE, Zelcer H, Dunkel Schetter C, & Chavira DA (2020). Psychological interventions for depression and anxiety in pregnant Latina and Black women in the United States: A systematic review. Clinical Psychology & Psychotherapy, 27(2), 249–265. 10.1002/cpp.2424 [PubMed: 31960525]

Ramos IF, Guardino CM, Mansolf M, Glynn LM, Sandman CA, Hobel CJ, & Dunkel Schetter C (2019). Pregnancy anxiety predicts shorter gestation in Latina and non-Latina white women: The role of placental corticotrophin-releasing hormone. Psychoneuroendocrinology, 99(6), 166–173. 10.1016/j.psyneuen.2018.09.008 [PubMed: 30245329]

Rini CK, Dunkel-Schetter C, Wadhwa PD, & Sandman CA (1999). Psychological adaptation and birth outcomes: The role of personal resources, stress, and sociocultural context in pregnancy. Health Psychology, 18(4), 333–345. 10.1037/0278-6133.18.4.333 [PubMed: 10431934]

Robinson AM, Benzies KM, Cairns SL, Fung T, & Tough SC (2016). Who is distressed? A comparison of psychosocial stress in pregnancy across seven ethnicities. BMC Pregnancy and Childbirth, 16(1), Article 215. 10.1186/s12884-016-1015-8

Saisto T, Salmela-Aro K, Nurmi JE, Könönen T, & Halmesmäki E (2001). A randomized controlled trial of intervention in fear of childbirth. Obstetrics and Gynecology, 98(5), 820–826. 10.1016/S0029-7844(01)01552-6 [PubMed: 11704175]

Salas-Wright CP, Robles EH, Vaughn MG, Córdova D, & Pérez-Figueroa RE (2015). Toward a typology of acculturative stress: Results among Hispanic immigrants in the United States. Hispanic Journal of Behavioral Sciences, 37(2), 223–242. 10.1177/0739986315573967

Saxbe D, Rossin-Slater M, & Goldenberg D (2018). The transition to parenthood as a critical window for adult health. American Psychologist, 73(9), 1190–1200. 10.1037/amp0000376 [PubMed: 30525801]

Scherer S, Alder J, Gaab J, Berger T, Ihde K, & Urech C (2016). Patient satisfaction and psychological well-being after internet-based cognitive behavioral stress management (IB-CBSM) for women with preterm labor: A randomized controlled trial. Journal of Psychosomatic Research, 80(5), 37–43. 10.1016/j.jpsychores.2015.10.011 [PubMed: 26721546]

Sharma V, & Mazmanian D (2014). The DSM-5 peripartum specifier: Prospects and pitfalls. Archives of Women's Mental Health, 17(2), 171–173. 10.1007/s00737-013-0406-3

Speed BC, Goldstein BL, & Goldfried MR (2017). Assertiveness training: A forgotten evidence-based treatment. Clinical Psychology: Science and Practice, 25(1), 1–20. 10.1111/cpsp.12216

Spielberger CD, & Reheiser EC (2009). Assessment of emotions: Anxiety, anger, depression, and curiosity. Applied Psychology. Health and Well-Being, 1(3), 271–302. 10.1111/j.1758-0854.2009.01017.x

Spielberger CD, Ritterband LM, Sydeman SJ, Reheiser EC, & Unger KK (1995). Assessment of emotional states and personality traits: Measuring psychological vital signs. Clinical personality assessment: Practical approaches, 42, Article 59.

Spielberger CHAD (1971). Development of the Spanish edition of the state-trait anxiety Inventory. Interamerican Journal of Psychology, 5(3–4), 145–158.

Stoll K, Swift EM, Fairbrother N, Nethery E, & Janssen P (2018). A systematic review of nonpharmacological prenatal interventions for pregnancy-specific anxiety and fear of childbirth. Birth, 45(1), 7–18. 10.1111/birt.12316 [PubMed: 29057487]

Tandon SD, Leis JA, Mendelson T, Perry DF, & Kemp K (2014). Six-month outcomes from a randomized controlled trial to prevent perinatal depression in low-income home visiting clients. Maternal and Child Health Journal, 18(4), 873–881. 10.1007/s10995-013-1313-y [PubMed: 23793487]

Titov N, Dear BF, Schwencke G, Andrews G, Johnston L, Craske MG, & McEvoy P (2011). Transdiagnostic internet treatment for anxiety and depression: A randomised controlled trial. Behaviour Research and Therapy, 49(8), 441–452. 10.1016/j.brat.2011.03.007 [PubMed: 21679925]

Tucker J, & Lowell C (2016). National snapshot: Poverty among women and families, 2015. National Women's Law Center.

Urizar GG Jr., & Muñoz RF (2011). Impact of a prenatal cognitive-behavioral stress management intervention on salivary cortisol levels in low-income mothers and their infants. Psychoneuroendocrinology, 36(10), 1480–1494. 10.1016/j.psyneuen.2011.04.002 [PubMed: 21641117]

Urizar GG Jr., Caliboso M, Gearhart C, Yim IS, & Dunkel Schetter C (2019). Process evaluation of a stress management program for low-income pregnant women: The SMART moms/mamás LÍSTAS project. Health Education & Behavior, 46(6), 930–941. 10.1177/1090198119860559 [PubMed: 31390900]

Urizar GG Jr., Yim IS, Rodriguez A, & Schetter CD (2019). The SMART moms program: A randomized trial of the impact of stress management on perceived stress and

cortisol in low-income pregnant women. Psychoneuroendocrinology, 104(2), 174–184. 10.1016/j.psyneuen.2019.02.022 [PubMed: 30852278]

Westdahl C, Milan S, Magriples U, Kershaw TS, Rising SS, & Ickovics JR (2007). Social support and social conflict as predictors of prenatal depression. Obstetrics and Gynecology, 110(1), 134–140. 10.1097/01.AOG.0000265352.61822.1b [PubMed: 17601908]

Williams MT, Chapman LK, Wong J, & Turkheimer E (2012). The role of ethnic identity in symptoms of anxiety and depression in African Americans. Psychiatry Research, 199(1), 31–36. 10.1016/j.psychres.2012.03.049 [PubMed: 22513043]

Woods-Giscombé CL, Lobel M, & Crandell JL (2010). The impact of miscarriage and parity on patterns of maternal distress in pregnancy. Research in Nursing & Health, 33(4), 316–328. 10.1002/nur.20389 [PubMed: 20544819]

Yuvaci HU, Cinar N, Caka Y, Topal S, Peksen S, Saglam N, & Cevrioglu AS (2020). Effects of antepartum education on worries about labor and mode of delivery. Journal of Psychosomatic Obstetrics and Gynecology, 42(3), 228–234. 10.1080/0167482X.2020.1725465 [PubMed: 32050831]

What is the public health significance of this article?

This study suggests that cognitive behavioral stress management as a treatment for subclinical anxiety among Latinas and Black women may be efficacious, but only if all sessions are attended. Research examining the impact of dosage and strategies to improve adherence may be a meaningful future direction to improve treatments for ethnic and racial minority women with prenatal anxiety.

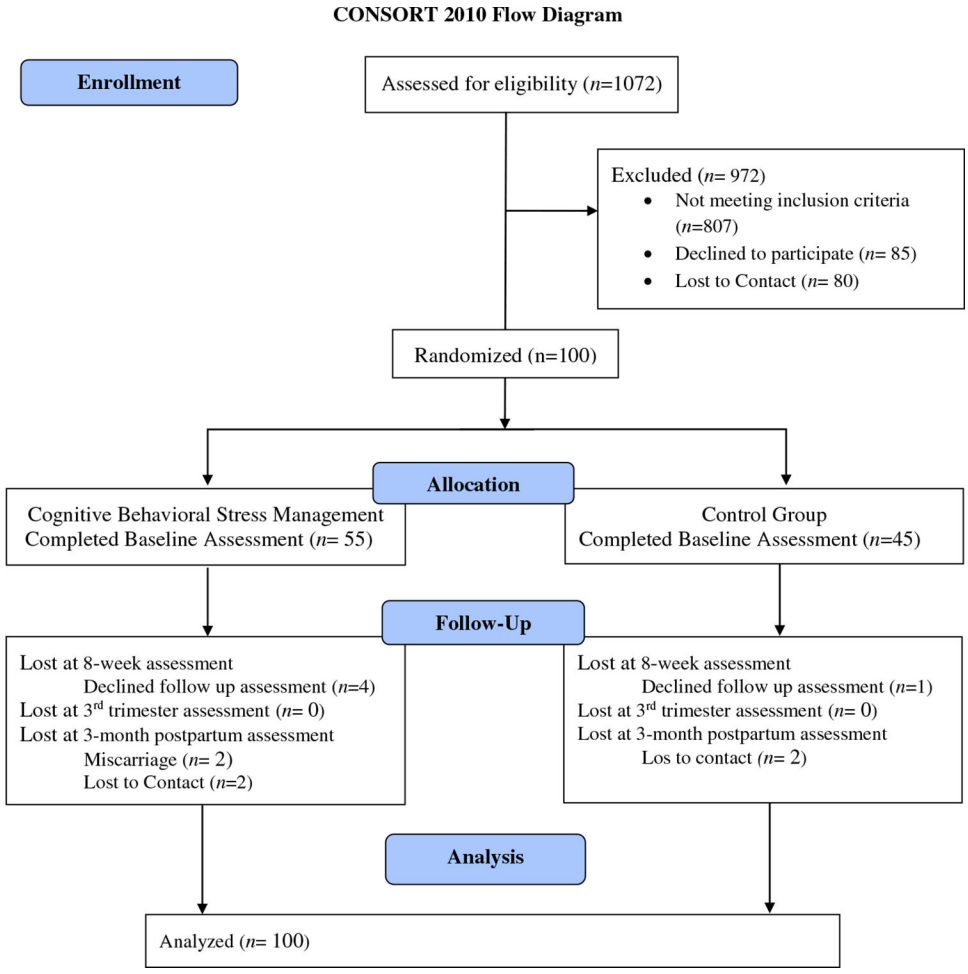

Figure 1.

CONSORT Flow Diagram

Note. See the online article for the color version of this figure.

Table 1

Sample Characteristics (n = 100)

Sociodemographic variables	*M* (*SD*) or *n* (%)	
	CBSM (*n* = 55)	Control (*n* = 45)
Age	26.3 (.9)	26.8 (.9)
Married/cohabitating with baby's father at T1	26 (47.3)	23 (51.1)
Number of prior births		
0	21 (38.2)	16 (35.6)
1	12 (21.8)	10 (22.2)
2 or more	22 (40.0)	19 (42.2)
Race/ethnicity		
Latina	38 (69.1)	33 (73.3)
Black	9 (16.4)	9 (20.0)
Nativity		
U.S. born	23 (41.8)	20 (44.4)
Foreign born[a]	32 (58.2)	25 (55.6)
Language preference		
Spanish	24 (43.6)	18 (40.0)
English	31 (56.4)	27 (60.0)
Total family income before taxes		
Less than $10,000	26 (47.3)	14 (31.1)
$10,000–19,999	17 (30.9)	18 (40.0)
$20,000 or more	11 (20.4)	13 (28.9)
Education		
Less than high school	16 (29.1)	20 (44.4)
High school graduate/GED	21 (38.2)	14 (31.1)
College courses or college degree	18 (32.8)	11 (24.4)
Internalizing symptoms at baseline		
State anxiety symptoms	16.4 (6.2)	17.2 (6.1)
Pregnancy specific anxiety symptoms	16.3 (3.9)	16.8 (5.3)
Depressive symptoms	7.5 (4.8)	8.6 (6.1)

	M (*SD*) or *n* (%)	
Sociodemographic variables	**CBSM (*n* = 55)**	**Control (*n* = 45)**
Possible depression (EPDS = >10)	19 (34.5)	14 (31.1)

Note. CBSM = cognitive behavioral stress management; GED = general education development diploma; EPDS = Edinburgh Postnatal Depression Scale.

[a]Foreign born women where primarily from Mexico (87.7%).

J Consult Clin Psychol. Author manuscript; available in PMC 2023 March 24.

Table 2

Tests of Fixed Effects for Linear Mixed Models for and State and Pregnancy-Specific Anxiety in Intent-to-Treat and Completer Group Analyses

	Model 1: ITT state anxiety		Model 2: ITT pregnancy-specific anxiety		Model 3: Completers state anxiety		Model 4: Completers pregnancy-specific anxiety	
Variable	***F*(*df* num, *df* denom.)**	***p* value**	***F*(*df* num, *df* denom.)**	***p* value**	***F*(*df* num, *df* denom.)**	***p* value**	***F*(*df* num, *df* denom.)**	***p* value**
Intercept	663.73 (1, 361)	<.001	536.14 (1, 94.71)	<.001	378.99 (1, 93.10)	<.001	538.50 (1, 94.36)	<.001
Time	.72 (3, 361)	.543	1.68 (2, 184.53)	.189	1.86 (3, 270.73)	.137	1.59 (2, 183.64)	.207
Intervention group	.255 (1, 361)	.614	.08 (1, 94.05)	.776	—	—	—	—
Completer group	—	—	—	—	.32 (2, 92.51)	.726	.19 (2, 93.92)	.830
Latina ethnicity	.87 (1, 361)	.350	1.24 (1, 94.20)	.269	.53 (1, 93.21)	.469	1.26 (1, 93.21)	.265
Financial hardship	3.37 (1, 361)	.067	.731 (1, 117.69)	.394	2.63 (1, 95.42)	.108	1.42 (1, 115.86)	.415
Baseline depression	150.54 (1, 361)	<.001	30.82 (1, 95.81)	<.001	87.53 (1, 92.42)	<.001	30.99 (1, 94.31)	<.001
Parity	—	—	12.74 (1, 94.27)	.001	—	—	12.84 (1, 93.21)	.001
Intervention Group × Time	.51 (3, 356)	.675	.75 (2, 184.39)	.472	—	—	—	—
Completer Group × Time	—	—	—	—	2.35 (6, 270.67)	.032	.57 (4, 183.50)	.687
Information criteria								
AIC	2220.25		1537.57		2176.23		1530.32	
BIC	2224.14		1544.80		2183.99		1537.52	
LI Residual (σ2)	23.85		8.42		17.66		8.48	

Note. AIC = Akaike's information criteria; BIC = Bayesian information criteria.

Table 3

Estimated Means for State and Pregnancy-Specific Anxiety by Intervention Group

	Baseline		Post-treatment		3rd trimester follow-up		3-month postpartum	
Measure	***M* (*SE*)**	**95% CI [LL, UL]**	***M* (*SE*)**	**95% CI [LL, UL]**	***M* (*SE*)**	**95% CI [LL, UL]**	***M* (*SE*)**	**95% CI [LL, UL]**
STPI-S								
CBSM	16.48 (.67)	[15.16, 17.80]	15.84 (.70)	[14.50, 17.27]	17.56 (.73)	[16.12, 19.01]	16.13 (.72)	[14.70, 17.56]
Control	16.73 (.74)	[15.27, 18.19]	17.06 (.75)	[15.84, 18.53]	16.95 (.75)	[15.48, 18.43]	16.34 (.78)	[14.82, 17.87]
PRA								
CBSM	16.83 (.58)	[15.68, 17.98]	17.58 (.61)	[16.38, 18.77]	18.07 (.62)	[16.85, 19.30]	—	—
Control	17.23 (.65)	[15.95, 18.50]	17.11 (.65)	[15.83, 18.39]	17.54 (.65)	[16.26, 18.83]	—	—

Note. STPI-S = State and Trait Personality Inventory-state; CBSM = cognitive behavioral stress management; PRA = Pregnancy Related Anxiety scale.

Table 4

Estimated Means for State and Pregnancy-Specific Anxiety by Completion Group

Measure	Baseline		Post-treatment		3rd trimester follow-up		3-month postpartum	
	M (*SE*)	95% CI [LL, UL]	*M* (*SE*)	95% CI [LL, UL]	*M* (*SE*)	95% CI [LL, UL]	*M* (*SE*)	95% CI [LL, UL]
STPI-S								
CBSM completers	17.94 (1.17)	[15.63, 20.24]	13.18 (1.24)	[10.74, 15.61]	17.05 (1.24)	[14.62, 19.49]	15.93 (1.24)	[13.49, 18.36]
CBSM non-completers	15.75 (.81)	[14.15, 17.35]	17.11 (.84)	[15.45, 18.77]	17.74 (.89)	[15.98, 19.49]	16.27 (.88)	[14.53, 18.00]
Control	16.71 (.75)	[15.24, 18.19]	17.01 (.76)	[15.52, 18.50]	16.91 (.76)	[15.42, 18.39]	16.33 (.78)	[14.80, 17.86]
PRA								
CBSM Completers	17.63 (1.01)	[15.63, 19.63]	17.76 (1.06)	[15.67, 19.84]	18.23 (1.05)	[16.15, 20.31]	—	—
CBSM Non-Completers	16.46 (.70)	[15.08, 17.83]	17.50 (.72)	[16.07, 18.93]	18.02 (.75)	[16.53, 19.51]	—	—
Control	17.23 (.65)	[15.95, 18.51]	17.12 (.65)	[15.83, 18.40]	17.55 (.65)	[16.26, 18.83]	—	—

Note. STPI-S = State and Trait Personality Inventory-state; CBSM = cognitive behavioral stress management; PRA = Pregnancy Related Anxiety scale.