Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

Health Care Women Int. Author manuscript; available in PMC 2016 March 01.

Published in final edited form as:

Health Care Women Int. 2015 March ; 36(3): 356–374. doi:10.1080/07399332.2014.973956.

Correlates of Depressive Symptoms After Birth for Latinas Who Are Overweight or Obese

Kathie Records,
College of Nursing & Health Innovation, Arizona State University, Phoenix, Arizona, USA

Colleen Keller,
College of Nursing & Health Innovation, Arizona State University, Phoenix, Arizona, USA

Dean Coonrod,
Maricopa Integrated Health System/District Medical Group; and College of Medicine, University of Arizona, Phoenix, Arizona, USA

Barbara Ainsworth,
School of Nutrition and Health Promotion, Arizona State University, Phoenix, Arizona, USA

Michael Todd,
College of Nursing & Health Innovation, Arizona State University, Phoenix, Arizona, USA

Michael Belyea,
College of Nursing & Health Innovation, Arizona State University, Phoenix, Arizona, USA

Allison Nagle-Williams,
College of Nursing & Health Innovation, Arizona State University, Phoenix, Arizona, USA

Paska Permana, and
Phoenix Veteran's Administration Health Care System, Phoenix, Arizona, USA

Sonia Vega Lopez
College of Nutrition and Health Promotion, Arizona State University, Phoenix, Arizona, USA

Abstract

Depression symptoms and overweight/obesity are common concerns during childbearing. Both conditions are associated with poor outcomes at birth and can have long-lasting consequences. Predictors of depressive symptoms among overweight and obese low-income and ethnically diverse women are not known. Data are from the Madres para la Salud trial with 139 postpartum Latinas. Depressive symptoms during a prior pregnancy were positively related while social support and moderate intensity physical activity were negatively related to depressive symptoms after birth. Social support and physical activity may be effective interventions, particularly for women who have experienced depressive symptoms in a prior pregnancy.

Address correspondence to Kathie Records, College of Nursing & Health Innovation, Arizona State University, 500 North 3rd Street, Phoenix, AZ 85004, USA. Kathie.records@asu.edu.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Postpartum depression (PPD) remains a significant and debilitating illness, affecting women worldwide. Researchers have conducted numerous studies to identify the prevalence rates and contributors to depression after birth and, at best, have evidence that strongly supports a few determinants that are difficult to change (e.g., country or individual income ranking). Researchers also contend with confounders and may restrict their inclusion criteria to limit comorbid conditions of participants. We chose to examine two conditions that are common during childbearing, overweight/obesity and depression symptoms, in a cross-sectional study with low-income Latinas. Our rationale was that this approach, if fruitful, could inform mental health professionals, community health or lay health workers, and health care providers who are implementing behavior change and lifestyle interventions.

Background

Maternal mental health is an essential foundation to meeting Millenium goals 4 (reduce child mortality) and 5 (improve maternal health), however the period prior to and after childbirth appears to be a heightened time of vulnerability to mental illness, particularly the occurrence of depression symptoms. Depression is the leading cause of disability in women and the most prevalent of all childbearing-related illnesses (Ritter, Hobfoll, Lavin, Cameron, & Hulsizer, 2000). Depression after birth is a global public health concern (Torres-Harding, Jason, & Taylor, 2002), but not all women experience depression symptoms. Social support demonstrates consistent and inverse relationships with depression symptoms during childbearing (Field, Hernandez-Reif, Feijo, & Freedman, 2006; Tilt, 2010) while physical activity in the general population is related to decreased depression symptoms (Tillotson, 2003).

Concomitantly, overweight and obesity are common during the childbearing years. Health risks associated with overweight and obesity are no longer limited to high-income countries as even low- to middle-income countries are experiencing dramatic increases in obesity rates (World Health Organization, 2013a). In the United States, over 50% of women are overweight or obese during their childbearing years (American College of Obstetricians and Gynecologists, 2013), with even higher rates of overweight and obesity among particular subgroups, such as Hispanics. Excess weight is an even greater concern for Hispanic women who are childbearing because their shortened inter-pregnancy intervals (Kimerling, 2010) present greater challenges to lose weight gained during each gestation.

Researchers have identified a number of predictors of overweight and obesity after birth. These include being obese prior to pregnancy, excessive gestational weight gain, single marital status, and being physically inactive (Gunderson, Abrams, & Selvin, 2000; Ostbye, Peterson, Krause, Swamy, & Lovelady, 2012). Age related to menarche and childbearing appears to be a contributor to overweight status after birth (Gunderson et al., 2000), particularly for women who experience menarche at less than 12 years and who give birth within 8 years. Strong evidence links depression to an increased risk for obesity during the childbearing years or after birth (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Gomez, 2011; Jones, 2012).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

The consequences of overweight and obesity after birth affect the woman and her child. Overweight and obesity is a predictor of being physically inactive (Pereira et al., 2007) and they are strong risk factors for cardiovascular disease, metabolic syndrome, and diabetes later in life (Gunderson, 2009). Maternal obesity is now linked to subsequent childhood obesity as researchers reported that early pregnancy BMI and infant birth weight were significantly related to the child's weight at 4 years of age (Olson, Demment, Carling, & Strawderman, 2010).

Statement of the Problem

Although past research has identified several correlates and predictors of depressive symptoms after birth, there are a number of gaps in the literature. There is limited understanding of the comorbidity of depressive symptoms and obesity, particularly for postpartum Latinas who have high fertility rates, relatively short inter-pregnancy intervals, and rates of overweight and obesity that exceed the national prevalence rates. More information is needed about the influence of social support among postpartum Latinas who often have large families and a large number of household members. This report addresses this knowledge gap in the literature by focusing on postpartum Latinas and answering the following research question: What are the correlates of depressive symptoms after birth for Latinas who are obese or overweight? Identification of predictors unique to this vulnerable group may provide evidence for early interventions that mental health practitioners and health care providers can implement to improve outcomes and lessen symptoms for those most at-risk as obesity rates rise worldwide.

Methods

Design

The data in this report are from the baseline data collected as part of a randomized controlled trial, *Madres para la Salud* [Mothers for Health], testing a 48-week culturally-tailored social support and physical activity intervention to affect changes in body fat, depressive symptoms, and fat tissue and systemic inflammation among Latinas within the first six months after giving birth. Here we present cross-sectional exploratory analyses examining associations between self-reported PPD and theoretically important predictors (prior depression, social support, and physical activity), while controlling for background factors (age, number of people in the household, and number of live births).

Setting

The setting for the study was a major urban city in the Southwestern United States. Recruitment took place in hospital postpartum units and community agencies and by using word of mouth. The institutional review boards of the investigators' university and a partnering hospital approved the study. All participants read and signed the informed consent prior to data collection.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Sample

Inclusion criteria for the *Madres* study are reported in Keller et al. (2014). Briefly, we invited women who were 18 years of age or older and who gave birth within the past six months to healthy newborns to participate. Women self-identified as being of Hispanic origin and were able to read and speak in English or Spanish. We enrolled women with body mass indexes between 25 and 35 km/m^2 who were habitually sedentary (< 2.5 hours per week of moderate intensity activity) with no plans to become pregnant in the next year. The Stanford Brief Activity Questionnaire (SBAS) was used to assess the PA levels of potential participants prior to enrollment.

One hundred and seventy-seven women enrolled in the study through convenience sampling, but 38 failed to complete baseline data collection. Therefore, the final sample consisted of 139 women who provided informed consent and participated in data collection (Keller et al., 2014). Dropouts did not significantly differ from participants in the final sample in terms of demographics (age, number of people in household, years in US, income, employment status, marital status, education level), BMI, number of live births, depression during prior pregnancy(ies), weeks postpartum at data collection, self-reported PA levels, or depression symptoms.

Measurement

The main outcome indicator was depressive symptoms, as measured by the Edinburgh Postnatal Depression Scale (EPDS). Additional instruments used included the Medical Outcomes Study Social Support Survey (MOS), the Stanford Brief Activity Scale, physical activity (pedometer and accelerometer data), and a demographic information survey. A complete description of the instruments is in (Identifiers removed for blind review).

Depressive symptoms—The Edinburgh Postnatal Depression Scale (EPDS) is a 10-item questionnaire with 4-point ordered response options. Total scores range from 0 to 30, with higher scores indicating more severe depression symptoms. Total scores of ≥12 indicate the likelihood of depression; scores ≥16 indicate the likelihood of major depression (J. Cox & Holden, 2007; J. L. Cox, Holden, & Sagovsky, 1987). Researchers have validated the EPDS in numerous clinical studies with pregnant and postpartum women (Records & Rice, 2005; Records & Rice, 2009) and it is available in English and Spanish (Fisher, Burnet, Huang, Chin, & Cagney, 2007). Cronbach's alpha for the total scale score in the current study was . 82. In our analyses, we used a dichotomous measure of depression, such that those with EPDS scores <12 were coded as 0 (not depressed), and those with scores ≥12 coded as 1 (depressed).

Social support—We used the 19-item Medical Outcomes Study (MOS) Social Support Survey (Howell, Mora, & Leventhal, 2006) to measure the affection, emotional or informational, positive social interaction, and tangible domains of social support. Response options ranged from 1 (*a little of the time*) to 5 (*all of the time*), with higher scores indicating greater perception of support. Researchers studying both English- and Spanish-speaking samples have found the internal consistency for the subscales to be acceptable (Howard,

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Flach, Mehay, Sharp, & Tylee, 2011), and in the current study, Cronbach's alpha for the total scale score = .96.

Physical activity—The Stanford Brief Activity Questionnaire (SBAS) classifies workplace (or housework) and leisure time PA levels separately using five categories ranging from inactive to vigorous-intensity activity with a final summary across both domains yielding the same five categories of PA level. Reliability estimates are strong as reported by Taylor-Piliae et al. (2010) in studies of older women and test-retest stability was moderate ($r = .39$, $p < .01$) over a 6-month period in the current study. In our baseline data, we observed SBAS-scored PA levels in three categories: inactive, light intensity, and moderate intensity. Accordingly, we coded this measure using two dummy vectors with inactive serving as the reference category.

PA intensity was also assessed using data from electronic monitoring devices. We used the ActiGraph GT1M accelerometer (Pensacola, FL) to measure the rate and magnitude of body movements in a vertical plane. A detailed protocol for the accelerometer used is described elsewhere (Ainsworth et al., 2013; Tang & Newcomb, 1998), but briefly, participants were instructed to wear the ActiGraph for 7 days. Each day they wore the device, participants were instructed to write the times when (a) they put the device on in the morning, (b) when they took the device off before going to bed, and (c) times during waking hours when they did not wear the device. With a one-minute epoch length for aggregating movement counts, we used the Freedson (Kleinman, Eisenberg, & Good, 1978) and Matthews (Shepard, 2006) ActiGraph cut points to generate the following discrete PA intensity levels: sedentary (< 100 counts), light-intensity (100–760 counts), moderate-lifestyle intensity (760–1,951 counts), moderate-walking intensity (1,952–5,724 counts), and vigorous intensity (> 5,725 counts). Data were averaged over 7 days, and we used data only for those participants who wore the device 3 or more days on which counts were recorded for ≥10 hours/day. The majority of participants (86%) complied with the actigraph protocol and there were no device malfunctions (Ainsworth et al., 2013).

We also assessed PA using total step counts and aerobic step counts generated by the Omron HJ-720ITC pedometer (Shelton, CT). Participants wore the pedometer for 7 days during waking hours (concurrent with the accelerometer monitoring). Aerobic intensity steps were determined using a counter mechanism that identifies steps taken during epochs with rates of >100 steps per minute as aerobic steps (Marshall et al., 2009; Tudor-Locke et al., 2011). As with the accelerometer data, we averaged pedometer data over the 7 days. Total steps/day and aerobic steps/day values were computed for each participant.

Demographic, background, and anthropometric characteristics—Participants completed a 30-item questionnaire assessing common demographic characteristics of the sample (e.g., age, marital status, education level, employment status). From these items we selected participant's age, number of persons in her household, and her reports of depressive episodes experienced during previous pregnancies for use in our primary analyses. We obtained physical measurements for height, weight, waist and hip circumference using standard protocols. All physical measurements were repeated 3 times and the average measure was used in all statistical procedures.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Procedure

We trained *Promotoras* as research assistants and interventionists and collected baseline data from November 2009 through October 2011. Data collection occurred in participant's homes, prenatal care offices, or at an agreed upon location, such as a community center or clinic. All participants completed the study instruments, in either Spanish or English, in dialogue with the interventionists. Interventionists scored the EPDS on-site and all participants scoring > 12 received referrals to community-based support services. Immediate intervention occurred if participants scored > 16 or revealed suicidal thoughts. No adverse events occurred during the study.

Analysis

Demographic and background variables were examined using frequencies and descriptive statistics. Correlations were calculated for all predictor variables included in our logistic regression models (described below) and postpartum depressive symptoms, as measured by raw EPDS scores and our dichotomous indicator. Variables that significantly correlated ($p < .05$) with EPDS scores in the current data and those that prior studies or theoretical hypotheses identified as being relevant were entered as predictors into a set of five multiple logistic regression models with our dichotomous indicator of postpartum depressive symptoms (EPDS) as the dependent variable. The models were identical except for the measure of physical activity (dummy coded SBAS, total pedometer steps, aerobic pedometer steps, moderate accelerometer-measured activity, vigorous accelerometer-measured activity) used as a predictor. Because standard maximum likelihood estimation of logistic regression models can perform poorly in small samples (e.g., yielding biased estimates), we used penalized maximum likelihood estimation (Firth, 1993) as implemented in SAS PROC LOGISTIC to generate parameter estimates and standard errors in which so-called "small sample bias" is minimized (Heinze & Schemper, 2002).

Results

Sample Characteristics

Women enrolled in the study at a mean of 12.2 weeks after giving birth (95% CI [11.1, 13.3], range = 1.6 to 29.9 weeks). The typical participant was 28 years of age (*S.D.* = 5.6), with a high school diploma or G.E.D, married or living with her partner, and unemployed (See Table 1). The average body fat percentage of participants was 38.6 (*S.D.* = 4.62). The participants had lived in the United States for a mean of 11.8 years (Mdn = 10.5 years, range = 1 – 37 years) and they represented every socioeconomic category, with most participants reporting yearly household incomes of less than $20,000 ($n$ = 96, 69.1%). They lived in households with a median of 5 other people (range 3 – 14) and 3 children (range = 1–12; mode = 2, 28.1%) (Keller et al., 2013).

Participants had been pregnant from 1 to 7 times (Mdn = 3; mode = 2, 25.9%) and the number of children resulting from these pregnancies ranged from 1 to 6 (Mdn = 3; mode = 2, 27.3%). Women reported feeding their infants by breastfeeding exclusively (15.8%), using mixed feeding (breast and formula, 44.0%), or using only formula (38.8%). Of the

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

women who were breastfeeding (*n* = 83), most (*n* = 72, 86.7%) reported 3 to 10 feedings per day (Mdn = 9; mode = 8, 16.9%; range 2 – 22 feedings per day).

One fourth of the sample (*n* = 34, 24.5%) scored as depressed on the EPDS, with 23 women (16.6%) meeting the scoring criteria for a likelihood of depression (≥ 12 and < 16) and another 11 women (7.9%) meeting the scoring criteria for major depression (≥ 16). Ten women (7.2%) indicated thoughts of harming themselves to some degree in a positive answer to item 10 on the EPDS. Of the 34 women who were depressed at entry into the study, 64.7% (n = 22) indicated that they remembered having depressive symptoms during their most recent pregnancy and 44% (*n* = 15) of women with two or more pregnancies reported depressive symptoms *prior* to the most recent pregnancy. Table 1 shows the descriptive statistics for the sample as a whole for the variables of interest.

Correlations among Model Variables

As shown in Table 2, dichotomously measured depression symptoms and total EPDS scores demonstrated significant positive associations with depression symptoms during any prior pregnancy (*r*s = .25 and .39, respectively, *p*s < .01) and negative associations with total social support (*r*s = −. 26 and −.29, respectively, *p*s < .01). No other predictor had significant zero-order associations with depression symptoms.

Logistic regression summary—The outcome measure in this set of five models was our dichotomous indicator of depression (0 = EPDS score < 12, 1 = EPDS score of 12 or higher). Model predictors (see Table 3) included background/demographic measures (age, number of people in household, number of live births), pre-/postpartum depression symptom history, social support (MOS overall score), and one of five physical activity measures (Stanford Brief Activity Survey [SBAS]; total pedometer steps; total aerobic pedometer steps; and moderate intensity activity and vigorous activity, as measured by the ActiGraph accelerometer). Findings are presented in terms of penalized likelihood estimated odds ratios (ORs) and 95% confidence intervals. Here the OR for each predictor variable represents the change in the odds of depression for every one unit change in the predictor. Across models, depression symptoms during any prior pregnancy were positively related to likelihood of depression within the first six months after birth (ORs = 2.86–3.87, *p*s = .007–.029; see Table 3). MOS overall score was negatively related to likelihood of depression (ORs = 0.48–0.52, *p*s =.003-.006, see Table 3). Those reporting moderate activity levels were marginally less likely to be depressed than those reporting being inactive as measured by the SBAS (OR = 0.17, *p* = .076, see Table 3). No other PA measures were associated with depression symptoms. As seen in Table 3, demographic (age, number of people in household) and other background factors (number of live births, weeks postpartum at time of data collection) were not significantly related to depression.

Discussion

This study of overweight or obese Latinas contributes to our understanding of the correlates of depressive symptoms after birth for primarily low income and sedentary women. Women with a prior experience of depression during pregnancy were almost four times more likely to be depressed up to six months after birth. These findings highlight the episodic and

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

chronic nature of depressive symptoms and suggest that a history of depressive symptoms during pregnancy may indicate the need for additional screening and services that continue after the final postpartum checkup, occurring approximately 4–6 weeks after birth. The average woman in this study was 3 months post-birth and there were women who were up to 6 months after birth – far beyond the time of their postpartum visit. Studies are needed that identify ways to increase women's help-seeking related to depressive symptoms associated with childbearing and increase the use of services for women of culturally-diverse groups. Reframing services needed as wellness focused or healthy motherhood might be effective.

Social support emerged as an important factor that was related to a lower likelihood of depressive symptoms for these Latina mothers after birth. Hispanic women often have high levels of support after birth for their roles as mothers and it is reassuring that for these participants, as their family size increased so did their availability of social support. The importance of the family and the mother's role within that family, la Familia, is well-documented in the literature as is the positive relationship between social support and other physical health indicators and behaviors (e.g., physical activity) (Kahn, Brandt, & Whitaker, 2004; Keck, Kessler, & Ross, 2008). Recent findings identify differences in social support and neighborhood by language.

Moderately active women experienced somewhat less depressive symptoms when compared with their more sedentary peers when measured by self-report. This finding is consistent with the findings of other research linking PA to positive mood state, including less depression symptoms and improved well-being (Tudor-Locke et al., 2004; Tudor-Locke et al., 2005; Tudor-Locke, Brashear, Johnson, & Katzmarzyk, 2010; Tudor-Locke, Johnson, & Katzmarzyk, 2011) and weight loss (Sichel & Driscoll, 2000; Tudor-Locke, Jones, Myers, Paterson, & Ecclestone, 2002). However, our objective measures of PA were not related to depressive symptoms in this sample. Further, while the objective measures correlated moderately with each other, there were no relationships with any other study variables including the SBAS. In contrast, the SBAS correlated strongly with the MOS Social Support survey. This suggests that the domains indexed by the SBAS may differ from those measured by objective measures of pedometers and accelerometers.

There were no significant relationships between number of people living in the household, the number of births (parity), the number of weeks postpartum and depressive symptoms. The participants in this sample lived in households with an average of 6 other people, which may suggest that other adults are available to help the Latina mother so that she has time to herself for PA or other activities. Parity was not related to depressive symptoms but did have a small negative correlation with social support. It is not known if women's needs for social support were met and this might be an important variable to include in future studies. Findings of no relationship between the number of weeks postpartum and depressive symptoms may relate to the cross-sectional design of this study and an inability to make conclusions regarding causality, whereas studies with significant findings often use prospective or longitudinal designs.

Further research might explore whether social support and physical activity level should be included in a risk profile for women's depressive symptoms after birth. More studies are

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

needed that focus on the complex interactions between comorbid conditions such as depression and obesity among postpartum Latinas. It is unknown how these interactions may be influenced by the stress of recent immigration or social marginalization, perceptions of ethnic identity, or neighborhood factors – all of which affect not only women's emotional well-being but their ability to participate in physical activities as well. These studies can help elucidate and optimize the health trajectories for women and their children.

Clinical Implications

Several findings are clinically relevant for health care professionals who care for women during pregnancy and after birth. Our findings that depressive symptoms from a prior pregnancy contributed to depression in the first six months after birth provides further evidence for care providers to address depression screening prior to birth and for an extended period of time afterward. The American College of Obstetricians and Gynecologists ([ACOG], 2010; 2012) and the United States Preventive Services Task Force (2009) acknowledge that there are multiple options for depression symptom screening. Both groups present comparative information on sensitivity and specificity of various screening scales to aid clinicians and researchers in making informed decisions.

In-depth clinician assessment might focus on women most at-risk; our findings indicated that risk for depressive symptoms increased from 6- to 10-fold for women who reported depression during a prior pregnancy. Depression during a prior pregnancy may be a critical assessment to include in a risk profile, enabling clinicians to identify which women to follow more closely after birth. The other major clinical concern in our findings is the number of women (7.2%) who report having suicidal thoughts within the first six months of birth, particularly those who are, on average, 3 months post birth. Heightened awareness among health professionals regarding the likelihood of suicidal thoughts after birth and expert communication skills may enable women and their families advance knowledge of signs, symptoms, and resources. Tailored education can reassure women and their families that effective treatment is available if negative feelings do develop and how to access appropriate support before a crisis develops.

The findings from this study suggest that social support and self-reported physical activity have significant relationships with respect to PPD symptoms. Further studies are needed to determine if these factors are important predictors of depressive symptoms after birth. The salience of supportive environments in the health of all women combined with the global recommendations for physical activity required for health are specified by the WHO (World Health Organization, 2013b) creates a cost-effective intervention that can be implemented in community-based settings. Further research is needed to delineate the ways in which women's reports of physical activity can be increased among diverse groups of women, to explore the conflicting findings between objective and subjective measures of PA among postpartum Latinas, and to identify the dose of physical activity required to prevent or lessen depressive symptoms during the childbearing years.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Limitations

Several limitations bear mentioning. Measurement decisions likely influenced the results. In this study, we used a composite index of social support rather than the four domains that are measured by the MOS. Using the individual domains of support in our analyses may have enriched our findings. For example, Surkan et al. (Surkan, Peterson, Hughes, & Gottlieb, 2006) found that as postpartum Hispanic mothers' social networks increased in size, their likelihood of depressive symptoms decreased. Future research efforts might explore the relative importance of one domain of support as compared with another.

In any study, participants' overestimation of duration or intensity of PA activities and lack of adherence to PA protocols for objective measures can compromise measurement precision. We intentionally chose to use several subjective and objective measures of PA to address these accuracy issues while acknowledging the busy lives of the participants who had multiple role demands from their new infants, families, and work. Participant burden may have contributed to the lack of significant findings related to our objective measures.

Underreporting of depressive symptoms, embarrassment or shame in sharing symptoms experienced, cultural variation in understanding of depressive symptoms, timing of measurement, and/or choice of scoring method may have affected our assessment and findings. The EPDS is a well-accepted screening tool with strong psychometrics including validation studies by the developers that resulted in a recommendation to use a cut score of 12/13 when used in primary care settings (J. L. Cox et al., 1987). This was consistent with our initial plans for recruitment but political unrest in the region of the study led us to more community-based recruitment. When recruiting in community settings, the developers have recommended a more stringent cut score be used (e.g., 9/10) to avoid missing true positives and acknowledged that researchers often use the lower scores to accommodate racially or ethnically diverse participants, (J. Cox & Holden, 2007) however our research team stayed with our original scoring plan and this may influenced our findings. In addition, a diagnostic psychological exam might have resulted in different results. We acknowledge that self-report of depressive symptoms during past pregnancies can be subject to recall bias. We believe that our use of *Promotoras* for data collection created a trust-relationship that encouraged women to report their true feelings.

Although our sample was heterogeneous with respect to socioeconomic status, marital status, and number of pregnancies, participants were predominately of Mexican descent and many of the young mothers had only recently immigrated to the U.S. The use of a convenience sample of sedentary and overweight Latinas from the Southwestern U.S. may limit generalizability to other populations of Latina mothers. Also, because of size of the sample, the statistical results are potentially subject to small sample biases; though, comparison of the penalized likelihood estimates reported here to parallel maximum likelihood estimates revealed only trivial differences in standard errors and no differences in estimates of odds ratios.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Conclusion

The findings add to our understanding of overweight or obese Latinas' experiences with depression after birth. Evidence supports the chronicity of depression during pregnancy, prior pregnancies, and within the first six months after birth and identifies that suicidal thoughts are significant concerns for these Latina mothers. Women with strong support systems who reported participating in moderate intensity physical activity were less likely to experience depressive symptoms than their peers with less support or less PA. Public health programs and community clinics may need to tailor their programs to reach this group of new mothers and health care providers may need to implement follow-up or support programs for depressive symptoms after birth, particularly for low-income women or those who speak only Spanish.

References

Ainsworth BE, Keller C, Herrmann S, Belyea M, Records K, Nagle Williams A, Coonrod DV. Physical activity and sedentary behaviors in postpartum Latinas: Madres para la Salud. Medicine and Science in Sports and Exercise. 2013; 45(7):1298–1306. [PubMed: 23439416]

American College of Obstetricians and Gynecologists. Committee opinion no. 549: Obesity in pregnancy. Obstetrics & Gynecology. 2013; 121:213–217. [PubMed: 23262963]

American College of Obstetricians and Gynecologists. Screening for depression during and after pregnancy. 2010; Reaffirmed 2012 Retrieved from http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Screening-for-Depression-During-and-After-Pregnancy.

Cohen JI. Stress and mental health: A biobehavioral perspective. Issues in Mental Health Nursing. 2000; 21(2):185–202. [PubMed: 10839060]

Cox, J.; Holden, J. Perinatal mental health: A guide to the Edinburgh Postnatal Depression Scale. London, England: Gaskell; 2007.

Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. The British Journal of Psychiatry: The Journal of Mental Science. 1987; 150:782–786. [PubMed: 3651732]

Firth D. Bias reduction of maximum likelihood estimates. Biometrika. 1993; 80(1):27–38.

Fisher TL, Burnet DL, Huang ES, Chin MH, Cagney KA. Cultural leverage: Interventions using culture to narrow racial disparities in health care. Medical Care Research and Review. 2007; 64:243S–282S. [PubMed: 17881628]

Gunderson EP, Abrams B, Selvin S. The relative importance of gestational gain and maternal characteristics associated with the risk of becoming overweight after pregnancy. International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity. 2000; 24(12):1660–1668.

Gunderson EP. Childbearing and obesity in women: Weight before, during, and after pregnancy. Obstetrics and Gynecology Clinics of North America. 2009; 36(2):317. [PubMed: 19501316]

Heinze G, Schemper M. A solution to the problem of separation in logistic regression. Statistics in Medicine. 2002; 21(16):2409–2419. [PubMed: 12210625]

Howard LM, Flach C, Mehay A, Sharp D, Tylee A. The prevalence of suicidal ideation identified by the edinburgh postnatal depression scale in postpartum women in primary care: Findings from the RESPOND trial. BMC Pregnancy & Childbirth. 2011; 11:57. [PubMed: 21812968]

Howell EA, Mora P, Leventhal H. Correlates of early postpartum depressive symptoms. Maternal & Child Health Journal. 2006; 10(2):149–157. [PubMed: 16341910]

Keller C, Ainsworth BE, Records K, Todd M, Belyea M, Vega-Lopez S, Nagle Williams A. A comparison of a social support physical activity intervention in weight management in postpartum Latinas. BMC Public Health. 2014; 14:971. [PubMed: 25233867]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Keller C, Todd M, Ainsworth BE, Records K, Vega-Lopez S, Permana P, Nagle Williams A. Overweight, obesity, and neighborhood characteristics of postpartum Latinas. Journal of Obesity. 2013 Article ID 916468. Retrieved from http://dx.doi.org/10.1155/2013/916468.

Kimerling R. Military-related sexual trauma among veterans health administration patients returning from Afghanistan and Iraq. American Journal of Public Health. 2010; 100(8):1409–1412. [PubMed: 20558808]

Kleinman A, Eisenberg L, Good B. Culture, illness, and care: Clinical lessons from anthropologic and cross-cultural research. Annals of Internal Medicine. 1978; 88:251–258. [PubMed: 626456]

LaComb RP, Taylor ML, Noble JM. Comparative evaluation of four microcomputer nutrient analysis software packages using 24-hour dietary recalls of homeless children. Journal of the American Dietetic Association. 1992; 92(11):1391–1392. [PubMed: 1430728]

Marshall SJ, Levy SS, Tudor-Locke CE, Kolkhorst FW, Wooten KM, Ji M, Ainsworth BE. Translating physical activity recommendations into a pedometer-based step goal: 3000 steps in 30 minutes. American Journal of Preventive Medicine. 2009; 35(5):410–415. [PubMed: 19362695]

Olson CM, Demment MM, Carling SJ, Strawderman MS. Associations between mothers' and their children's weights at 4 years of age. Childhood Obesity. 2010; 6(4):201–207. [PubMed: 21743836]

Ostbye T, Peterson BL, Krause KM, Swamy GK, Lovelady CA. Predictors of postpartum weight change among overweight and obese women: Results from the active mothers postpartum study. Journal of Women's Health (2002). 2012; 21(2):215–222.

Pereira MA, Rifas-Shiman S, Kleinman KP, Rich-Edwards J, Peterson KE, Gillman MW. Predictors of change in physical activity during and after pregnancy: Project viva. American Journal of Preventive Medicine. 2007; 32(4):312–319. Retrieved from http://ezproxy.umsl.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cmedm&AN=17383562&site=ehost-live&scope=site. [PubMed: 17383562]

Records K, Rice MJ. A comparative study of postpartum depression in abused and non-abused women. Archives of Psychiatric Nursing. 2005; 19(6):281–290. [PubMed: 16308128]

Records K, Rice M. Lifetime physical and sexual abuse and the risk for depression symptoms in the first 8 months after birth. Journal of Psychosomatic Obstetrics and Gynecology. 2009; 19(5):987–996.

Ritter C, Hobfoll SE, Lavin J, Cameron RP, Hulsizer MR. Stress, psychosocial resources, and depressive symptomatology during pregnancy in low-income, inner-city women. Health Psychology. 2000; 19(6):576–585. [PubMed: 11129361]

Seccombe K, Newsom J, Hoffman K. Access to health care after welfare reform. Inquiry. 2006; 43(2):167–178. [PubMed: 17004646]

Shepard VE. The obesity epidemic: Its causes and methods of assessment. Practice Nurse. 2006; 31(12):41–45.

Surkan PJ, Peterson KE, Hughes MD, Gottlieb BR. The role of social networks and support in postpartum women's depression: A multiethnic urban sample. Maternal & Child Health Journal. 2006; 10(4):375–383. [PubMed: 16404681]

Tang PC, Newcomb C. Informing patients: A guide for providing patient health information. Journal of the American Medical Informatics Association. 1998; 5:563–570. [PubMed: 9824803]

Torres-Harding SR, Jason LA, Taylor RR. Fatigue severity, attributions, medical utilization, and symptoms in persons with chronic fatigue. Journal of Behavioral Medicine. 2002; 25(2):99–113. [PubMed: 11977439]

Tudor-Locke C, Craig CL, Brown WJ, Clemes SA, De Cocker K, Giles-Corti B, Blair SN. How many steps/day are enough? for adults. International Journal of Behavior, Nutrition, and Physical Activity. 2011; 28(8):79.

U.S. Preventive Services Task Force. Screening for depression in adults. 2009 Retrieved from http://www.uspreventiveservicestaskforce.org/uspstf09/adultdepression/addeprrs.htm.

World Health Organization. Fact sheet on overweight and obesity. Geneva, Switzerland: Author; 2013a.

World Health Organization. Global strategy on diet, physical activity, and health. Geneva, Switzerland: Author; 2013b.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Key Interdisciplinary Messages

Almost one-fourth of the Latinas in this sample experienced significant depressive symptoms in the first six months after birth.

Depressive symptoms after birth are common, especially for women who are obese, overweight, or physically inactive.

Depression in a prior pregnancy increased women's risk of depressive symptoms while social support and self-reported physical activity contributed to a decrease in depressive symptoms after birth.

Social support and physical activity are cost-effective interventions to integrate in to home, clinic, and community settings, particularly for women who have had depressive symptoms during a prior pregnancy.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 1

Sample Demographics

Variable		Mean (SD)	n (%)
Age in years		28.0 (6.09)	
Education			
	None		1 (0.7)
	Elementary		29 (20.0)
	Some high school		21 (15.0)
	High school graduate		62 (44.3)
	Some college		18 (12.9)
	College graduate		10 (7.1)
Marital status			
	Single		15 (10.7)
	Married		63 (45.0)
	Divorced		1 (0.7)
	Separated		3 (2.1)
	Partnered		58 (41.4)
Employment			
	Part time		18 (12.9)
	Full time		15 (10.7)
	Unemployed		81 (57.9)
	Never employed		25 (17.9)
Socioeconomic Status (self-reported Yearly Income in Dollars)			
	0–10,000		32 (22.9)
	10,001–20,000		65 (46.4)
	20,001–30,000		21 (15.0)
	30,001–50,000		11 (7.9)
	50,001–75,000		4 (2.9)
	>75,000		4 (2.9)
Years in U.S.		11.8 (7.24)	
Number of Pregnancies		3.1 (1.58)	
	1		24 (17.1)
	2		36 (25.7)
	3		27 (19.3)
	4		23 (16.4)
	5		18 (12.9)
	6		8 (5.7)
	7		3 (2.1)
Number of Births		2.8 (1.38)	
	1		29 (20.7)
	2		38 (27.1)
	3		33 (23.6)

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Variable		Mean (SD)	n (%)
	4		22 (15.7)
	5		13 (9.3)
	6		5 (3.6)
Feeding Method			
	Breast only		22 (15.7)
	Breast more than bottle		34 (24.3)
	Breast and bottle equally		14 (10.0)
	Bottle more than breast		13 (9.3)
	Bottle feed only		55 (39.3)
Breastfeeding Times per Day			
Number of Children in the Home			
	0–2 years of age	1.3 (0.67)	
	3–5 years of age	0.5 (0.58)	
	6–12 years of age	0.9 (1.34)	
	13–18 years of age	0.3 (0.64)	
	Total	3.1 (1.67)	
Number of People in the Household		5.6 (2.00)	
Depressed during any prior pregnancy			
	Yes		65 (46.4)
	No		75 (53.6)
Depressive Symptoms (EPDS)		8.6 (4.93)	
	< 12		107 (76.4)
	≥ 12		33 (23.6)
EPDS Question 10 (harm self)			10 (7.1)

* Numbers may not add to 100% due to missing data or rounding

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 2

Pearson Correlations for EDPS Scores and Variables Used in Multiple Logistic Regression Models

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1.	EPDS (dichotomous indicator)	-												
2.	EPDS (Total score)	.77**	-											
3.	Age (years)	.14†	.01	-										
4.	Number of people in household	−.05	−.05	.13	-									
5.	Number of births	.10	.03	.62**	.42**	-								
6.	Depression during any prior pregnancy	.25**	.39**	−.03	.06	.13	-							
7.	Weeks postpartum	.12	.12	.01	−.04	−.04	.08	-						
8.	MOS overall score	−.26**	−.29**	−.04	−.03	−.18*	−.11	−.09	-					
9.	Moderate activity (min/day)[a]	.08	.07	−.04	.01	.07	.02	−.04	−.13	-				
10.	Vigorous activity (min/day)[a]	−.11	−.07	.06	.10	.05	−.11	.09	−.05	.47**	-			
11.	Total Steps per day[b]	−.08	−.02	−.08	−.05	−.03	−.02	.02	−.01	.51**	.33**	-		
12.	Aerobic steps per day[b]	−.05	.04	.07	−.11	−.07	.02	−.04	−.06	.55**	.61**	.40**	-	
13.	SBAS (light vs. inactive)[c]	−.01	.00	.06	−.12	−.09	−.05	−.13	.15†	−.11	−.11	.06	−.02	-
14.	SBAS (moderate vs. inactive)[c]	−.14	−.02	−.02	.05	.00	.23**	−.02	−.01	−.04	−.09	.01	.08	−.27**

Notes.

[a] Accelerometer-measured activity.

[b] Pedometer-measured activity.

[c] The Stanford Brief Activity Scale (SBAS) is represented by two dummy variables.

[c] The Stanford Brief Activity Scale (SBAS) is represented by two dummy variables with the first variable coding for the comparison of inactive (0) to light intensity activity (1) and the second variable coding for the comparison of inactive (0) to moderate intensity activity (1).

[b] $n = 125$.

[c] $n = 119$.

† $p < .10$.

* $p < .05$.

** $p < .01$.

Author Manuscript
Author Manuscript
Author Manuscript
Author Manuscript

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 3

Penalized Likelihood Estimates of Odds Ratios and (95% Confidence Intervals) from Multiple Logistic Regression Models Predicting Postnatal Depression from Physical Activity and Background Variables

	Physical Activity Measure				
Predictor	**SBAS[a,b]**	**Total Steps[c,d]**	**Aerobic Steps[c,d]**	**Moderate Activity[e,f]**	**Vigorous Activity[e,f]**
Age	1.10 (0.99, 1.22)	1.07 (0.97, 1.19)	1.08 (0.98, 1.20)	1.08 (0.98, 1.20)	1.09 (0.98, 1.21)
Number of people in household	0.93 (0.70, 1.19)	0.89 (0.68, 1.13)	0.88 (0.67, 1.13)	0.90 (0.68, 1.14)	0.91 (0.69, 1.16)
Number of live births	0.85 (0.51, 1.38)	0.96 (0.60, 1.52)	0.95 (0.58, 1.54)	0.84 (0.50, 1.35)	0.84 (0.50, 1.35)
Depression during prior pregnancy(ies)	3.87** (1.52, 10.80)	3.06* (1.27, 8.01)	3.21* (1.32, 8.51)	3.01* (1.23, 7.98)	2.86* (1.16, 7.64)
Weeks postpartum	1.02 (0.95, 1.08)	1.03 (0.97, 1.09)	1.03 (0.97, 1.09)	1.03 (0.97, 1.09)	1.03 (0.97, 1.09)
MOS: Overall social support	0.51** (0.31, 0.81)	0.52** (0.32, 0.82)	0.51** (0.32, 0.81)	0.49** (0.30, 0.79)	0.48** (0.29, 0.76)
Physical activity measure 1[a]	0.79 (0.30, 2.01)	1.00 (1.00 1.00)	1.00 (1.00, 1.00)	1.01 (0.98, 1.04)	0.78 (0.19, 1.17)
Physical activity measure 2[a]	0.17† (0.02, 0.85)	--	--	--	--

Notes.

[a]The 3 observed Stanford Brief Activity Scale (SBAS) categories are represented by two dummy variables with the first variable coding for the comparison of inactive (0) to light intensity activity (1) and the second variable coding for the comparison of inactive (0) to moderate intensity activity (1); all other physical activity measures are treated as continuous variables.

[b]$n = 137$.

[c]Pedometer-measured activity.

[d]$n = 136$.

[e]Accelerometer-measured activity.

[f]$n = 134$.

†$p < .10$.

*$p < .05$.

**$p < .01$.