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Understanding Depressive Symptoms among High-Risk Pregnant African American Women

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Introduction

Much has been written about depression and its risk factors, particularly among women. However, a growing body of literature on prenatal depression has begun to emerge, given that depression during pregnancy presents a major public health concern, since it is found to be a common experience among childbearing aged women (Gaynes et al., 2005; Marcus, 2009). In fact, the onset of depressive symptoms is most likely to occur between 20 to 40 years of age, the range when most women become pregnant (Marcus & Heringhausen, 2009). Further, prior studies have found rates of depression among pregnant women to range from ten to thirty percent (Gotlieb et al., 1989; Kurki et al., 2002). Importantly, depression during pregnancy can have adverse effects not only for the mother, but the unborn child as well. For example, it has been noted that depressive symptoms can lead to an increased risk for negative birth outcomes such as low birth weight and preterm delivery (Marcus, 2009; Marcus & Heringhausen, 2009), and can also result in serious effects after pregnancy, including the mother's own psychosocial functioning, poor mother-child relation, and the psychosocial development of the child (Boyd, Zayas, & McKee, 2006; Cicchetti, Rogosch, & Toth, 1998; Downey & Coyne, 1990). Therefore, the goal of this paper was to examine sociodemographic, psychosocial, and behavioral factors that influence depressive symptoms among high-risk African American pregnant women.

A recent epidemiological study on depression found that among African Americans, the prevalence rate for major depressive disorder was about 6% for the past-year and was 10.4% for their lifetime (Williams et al., 2007). Although prior research has found prevalence rates of up to thirty percent among low-income women of color (Boyd et al., 2006), relatively less is known

about the risk factors associated with depressive symptoms among urban, high-risk pregnant African American women, despite that this population shows twice the rate of depression than their male counterparts. For African Americans, residing in major metropolitan areas also increases their risk for major depressive disorder (Williams et al., 2007). Indeed, much of what we know from the literature on depression and gender has primarily derived from samples of European American, middle-class women (Warren, 1997) or focused on African Americans as an entire group, despite the relevance of these issues to the lives of African American women. This oversight is even more surprising, since research has consistently shown that African American women experience multiple sources of stress in their lives (Jackson et al., 2005; Woods-Giscombe & Lobel, 2008), and that greater exposure to stressors is associated with increased depressive symptoms (Barbee, 1992).

Although affective disorders such as depression are common during pregnancy, particularly because of the significant hormonal fluctuations that women encounter during this period (Marcus, 2009), factors beyond genetics can also increase the risk of depression. Indeed, various scholars have noted that for inner-city pregnant African American women, who must contend with chronic levels of stress in their everyday lives, such factors are very likely to contribute to poor psychological well-being (Warren, 1995), and possibly to the high rates of infant morbidity and mortality present among this population (Jackson et al., 2005; Orr & Miller, 1995; Orr et al., 2002). In fact, Hobfoll et al. (1995) found that among a financially impoverished sample of pregnant African American women, the rate of depression was double that found for middle-class samples. Other studies find that the risk of preterm outcomes among African American women compared to White women is approximately double (Orr et al., 2002; Wise, 1993). Indeed, studies have found that for Black and Hispanic women, the higher prevalence

rates of depressive symptoms compared to their non-Hispanic white counterparts is partially explained by lower income and financial hardship (Rich-Edwards et al., 2006). As such, these findings suggest that the vulnerability that is associated with lower socioeconomic status in addition to the genetic influences occurring during pregnancy can heighten the risk of depression for low-income African American women. In turn, higher levels of depressive symptoms may be associated with poor pregnancy outcomes (Orr & Miller, 1995).

At the same time, most research on pregnant African American women has relied on examining risk factors of depression, including sociodemographic influences such as education level, maternal age, and marital status. In general, known risk factors of depressive symptoms among African American women have included fewer socioeconomic resources, lower levels of educational attainment (e.g., less than a high school degree) and being single (e.g., either divorced or separated). Importantly, some studies have found prevalence rates of moderate or severe interpersonal violence (IPV) of up to 20% among low-income pregnant women (O'Campo et al., 1994), and that IPV is associated with depressive symptoms (Barbee, 1992; Hobfoll et al., 1995; Kiely et al., 2010; Lee et al., 2002; Martin et al., 1996). Indeed, examining the association between IPV and depressive symptoms among low-income African American women is important, given low-income women of color in particular are at an increased risk for both depression and IPV during pregnancy (O'Campo et al., 1996).

Likewise, associations between harmful health behaviors (e.g., smoking, cocaine use, alcohol use) and depression have been found among pregnant women as well as among low-income women (McCormick et al., 1990; Orr & Miller, 1995; Zuckerman, et al., 1989). However, less is known regarding the association between reproductive history and other pregnancy-related factors (e.g., intent) with depression (Frost & Condon, 1996). Certainly, intent

of pregnancy can relate to stress if the pregnancy is unwanted or mistimed. For example, Blake, Kiely, Gard and colleagues (2007) found that African American pregnant women who were unhappy about or had an unintended (e.g., mistimed and unwanted) pregnancy were at a greater risk for adverse outcomes (e.g., experiencing intimate partner violence, engaging in risk behaviors, being depressed in the past month) than women who were happy about their pregnancy and those who had an intended pregnancy. Likewise, the emotional costs (e.g., grief, distress) associated with pregnancy loss (e.g., miscarriage or stillbirth) can further compound low-income African American women's stress levels. As such, including non-sociodemographic factors as potential risk factors of depressive symptoms is important in order to get a more complete picture of the way in which risk factors across domains affect psychological well-being.

On the other hand, less research has been conducted that also captures protective factors, including resources used to deal with stressors, such as coping skills and support systems that may help offset or decrease the risk of depression (Barbee, 1992; Zayas et al., 2002). It may be that support systems and adaptive coping skills can be protective for pregnant women (Rich-Edwards et al., 2006; Warren, 1997), particularly for low-income African American women who face multiple types of stressors (Zayas et al., 2002). For example, Warren (1995) noted that for African American women, social networks, including family, friends and church affiliates, can help facilitate their ability to cope more effectively with stressors. At the same time, these social networks can provide emotional, practical, or financial resources when such resources are limited. As such, examining how coping strategies and support from a partner as well as from others influence depression among women who are most vulnerable to experiencing it,

particularly during pregnancy, are as equally important questions as is understanding risk factors of depression among this group of women.

Given the clinical public health concerns associated with poor mental health, especially during pregnancy and among an already socially marginalized group of women, paying particular attention to multiple risk and protective factors of depression becomes critical. Particularly where urban, low-income, pregnant African American women are concerned, it cannot be assumed that prior research findings can be generalized to these women (Hobfoll et al., 1995).

Present Study

In this paper we explore how sociodemographic, psychosocial, and behavioral measures (including both risk and protective factors) are associated with prenatal depression among urban, high-risk African American women. We hypothesized that lower socioeconomic position (i.e., lower education levels, unemployment, and being on public assistance) and interpersonal factors (i.e., intimate partner violence, being single or divorced) would be associated with higher levels of depressive symptoms. Further, behavioral risk factors have been shown to associate with greater risk of depression, including alcohol and drug use. Therefore, it was hypothesized that alcohol and illicit drug use during pregnancy would both be associated with higher levels of depression. Likewise, given the stress associated with having a history of live birth and miscarriage for example, as well as a mistimed and unwanted pregnancy, it is hypothesized that poor reproductive history and unintended pregnancies would be associated with higher levels of depression. At the same time, being unhappy about pregnancy is expected to be associated with greater levels of depressive symptoms when compared to those reporting being very happy about their pregnancy. Importantly, psychosocial factors such as support and adaptive coping have

been associated with a decreased risk for depression. As such, it is hypothesized that greater exposure to emotional support (from others and partner) and use of more adaptive coping will be associated with lower levels of depressive symptoms.

Methods

Research Design and Procedures

The present study is part of a larger randomized controlled trial (RCT), Health Outcomes of Pregnancy Education (Project DC-HOPE) that was a part of the NIH-DC Initiative to Reduce Infant Mortality in Minority Populations in the District of Columbia. The scope of the larger study is only briefly described in this paper (see El-Khorazaty, Johnson, & Kiely, 2007 and Katz, Blake, Milligan et al., 2008 for a detailed discussion of the RCT design and intervention). The intervention trial was focused on reducing behavioral and psychosocial risks for poor pregnancy outcomes among high-risk ethnic minority women in Washington, D.C. by targeting known risk factors shown to be associated with preterm delivery, low birth weight, and infant mortality (Katz et al., 2008). Participating institutions in Project DC-HOPE included Children's National Medical Center, Georgetown University, George Washington University Medical Center, Howard University, the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, the National Center on Minority Health and Health Disparities, and RTI International. The institutional review boards of all six participating institutions reviewed and approved all aspects of the study. All participants were financially compensated for their time and effort in the study.

For purposes of our study, we focus on data from baseline, which were conducted via telephone interview an average of nine to ten days after completion of an audio-computer-

assisted self-interview screening. Baseline data were collected prior to being randomized into one of the two conditions of the clinical trial.

Participants

Eligibility into the study required women to be a self-identified ethnic minority, be 18 years of age or older, a resident of Washington D.C., English-speaking, and be less than 28 weeks pregnant and to acknowledge one or more of the following risk factors: smoking, environmental tobacco smoke exposure (ETSE), depression or intimate partner violence (IPV). Of the eligible 1,070 women who were recruited from six community-based prenatal care clinics during July 2001-October 2003, and who consented (in writing) and completed a baseline telephone interview as part of the larger study, 1044 were self-identified as African American or black women. All 1,044 women were pregnant at the time of their baseline interview and were considered to be high-risk based on their responses on the aforementioned risk factor measures. The mean age among the sample was 24.57 years (SD = 5.41).

Measures

Demographic factors: Maternal age was divided into four categories: 18-20 years (the referent), 21-25 years, 26-30 years, and ≥ 31 years.

Socioeconomic Position: Three independent variables were used to measure socioeconomic position. Education level was divided into three categories: less than high school (the referent), high school diploma/GED, and at least some college. Employment status was a dichotomous variable: working (full- or part-time) or not currently working. Receipt of public assistance was constructed from receipt of WIC, public assistance, or food stamps. If the respondent answered ‘yes’ to receiving any of these forms of governmental assistance, the respondent was coded as receiving public assistance, whereas if the respondent answered no to

all three questions, the respondent was coded as not receiving governmental assistance. These items were highly correlated with one another, justifying our reason for combining them into one single variable. The final "receipt of public assistance" variable during the baseline interview was recoded as a dichotomous variable of "yes" or "no". The reference category was "No".

Interpersonal factors: Relationship status and IPV were included as part of interpersonal factors in all statistical models. Relationship status was categorized as married/cohabiting (the referent), single, or widowed/ divorced/ separated. Frequency of IPV was measured by the Revised Conflict Tactics Scale (CTS2; Straus, 1993) physical and sexual coercion subscales. The CTS2 also measures violence perpetrated by the woman on her partner; however, for purposes of our study we focused only on partner-perpetrated violence. We collapsed all 17 items into a single summary score, with higher scores reflecting greater frequency of IPV. Our scale showed high internal consistency ($\alpha = .91$).

Health Behaviors: Illicit drug use and alcohol use were assessed during pregnancy. Participants were asked to indicate whether they had used illicit drugs and alcohol (1=No [the referent]; 2=Yes) up until the baseline interview. These items were included as two independent dichotomous variables.

Pregnancy-Related Factors: Reproductive history; pregnancy intention (intended [the referent]; mistimed; unwanted); and happiness about pregnancy were included as pregnancy-related independent variables. The reproductive history variable was constructed from questions regarding whether the woman had ever had a live birth, miscarriage, stillbirth, and/or abortion. We collapsed all women who had a previous live birth and no loss (i.e., miscarriage or stillbirth), excluding voluntary abortion(s), into "previous live birth/no pregnancy loss"; women who had a previous live birth and previous loss (miscarriage or stillbirth), excluding abortion, were

classified as “previous live birth/previous loss”; women who had no previous live but had a previous loss (either miscarriage or stillbirth) were classified as “no previous live birth/only loss”; and women who had no previous live birth and no loss were classified as “no live birth/no loss.” Previous live birth/no pregnancy loss was used as the referent category in all analyses. For the item measuring happiness about being pregnant, women were asked which number between 1 (reflecting “very unhappy”) and 10 (reflecting “very happy”) best described how they felt when they found out they were pregnant. Based on scores provided, women were classified into one of three categories, including unhappy (score values 1-3), moderately happy (score values 4-7), and very happy (score values 8-10). The “very happy” category was used as the reference category in all analyses.

Coping Resources: The Negative Mood Regulation Scale (Catanzaro, 1993; Catanzaro, 1994; Mearns, 1991) was used to assess cognitive-behavioral coping with negative moods and affect. We used a 15-item short version of the scale. Sample items included “When I’m upset, I believe that telling myself it will pass will help me calm down” and “When I’m upset, I believe doing something for others will help me feel better.” Each item was rated on a five-point scale ranging from strongly agree to strongly disagree; negatively worded items were reverse coded. A summary score (range: 15-75) was obtained; higher scores reflected more positive expectancies regarding a participant’s ability to regulate their negative moods/affect during times when they were upset. Our scale showed high internal consistency ($\alpha = .80$). Emotional support from others, as well as from the woman’s current partner (irrespective of whether the current partner was the baby’s father), were included as two independent variables. Items were taken from the 11-item version of the Support Behaviors Inventory (Brown, 1986), which assesses a woman’s satisfaction with the degree of emotional support received from these two sources. Sample items

include, “My partner/Others tolerate my ups and downs and unusual behaviors,” and “My partner/Others does/do thoughtful things.” Responses to items are answered on a 6-point scale from “very dissatisfied” to “very satisfied.” The scale for each item was shifted to 0-5 (range 0-55), so that women who had no current partner received the lowest score (i.e., 0). The two separate scales had high internal consistency (Partner: $\alpha = .93$; Others: $\alpha = .96$).

Depressive Symptomatology: Prenatal depressive symptomatology in the past month was assessed using the Hopkins Symptom Checklist-Depression Scale (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974; Lipman, Covi, & Shapiro, 1979). The HSCL is a 20-item scale that measured the extent to which the participant was distressed by each of the symptoms presented (e.g., poor appetite, worthlessness, thoughts of suicide, restlessness). Items were answered on a five-point scale ranging from 1 (not all distressed) to 5 (extremely distressed). Responses were summed, with higher scores reflecting greater depressive symptoms within the past month. The HSCL has been shown to be a reliable and valid measure for use with African American women (Woods-Giscombe & Lobel, 2008). Our scale showed high internal consistency ($\alpha = .91$). Further, for bivariate analyses, we created a dichotomous measure of depression by stratifying the sample into depressed (moderate-to-severe) or non-depressed. Women with a mean score above .75 on the HSCL were categorized as depressed. For all other analyses, we used the HSCL as a continuous measure assessing depressive symptoms, and therefore should not be equated with clinically diagnosed depression.

Statistical Analysis

Pearson’s correlations were examined, and variables that were found to be highly correlated were removed in order to avoid issues of multicollinearity. Bivariate analyses were conducted to compare moderate-to-severely depressed and non-depressed women on a range of

sociodemographic, psychosocial, and behavioral measures. We tested differences on continuous variables using t-tests, and used chi-square tests of difference for categorical variables. Although there were some variables that were not significantly associated with depressive symptoms, we kept them in the multivariate models to examine their relation with depressive symptoms after adjusting for other variables, given univariate analyses only consider variables one at a time, whereas the adjustments from multiavariate analyses will control for variables simultaneously. In multivariate analyses, we built linear regression models to examine predictors of prenatal depressive symptoms from sociodemographic, psychosocial, and behavioral measures at baseline. Three variables had missing data, including education with 1 missing value, alcohol with 1 missing value, and pregnancy intention with 7 missing values. Given the relatively low number of missing data, we allowed for listwise deletion in all analyses. All analyses were conducted using Stata 11.1 (Stata Corp, College Station, Tex).

Results

Descriptive Statistics and Bivariate Comparisons

Table 1 presents sociodemographic characteristic, psychosocial, and behavioral risks of all participants as well as bivariate comparisons on these variables by depression cut-off criteria (e.g., moderately to severely depressed or non-depressed) at baseline. During baseline, the mean level of depressive symptoms among the total sample was 17.05 (*SD*= 14.06). The mean level of depressive symptoms among women who fell into the moderate to severely depressed category was 29.69 (*SD* = 11.55), and 6.97 (*SD* = 4.45) for women who fell into the non-depressed category. The majority of women were receiving some form of public/government assistance (e.g., food stamps), and almost half (46.55%) had at least a high school degree or GED.

When depressive symptomatology was dichotomotized into non-depressed and moderate-to-severely depressed just a little under half of all women (44.35%) were confirmed as depressed. There were significant associations on education level, IPV, illicit drug use, alcohol use, happiness about pregnancy, and all three coping resources variables by depression category. More women who were moderate-to-severely depressed compared to those who were not depressed, had less than a high school degree, reported higher levels of intimate partner violence, had lower rates of illicit drug use during pregnancy, felt unhappy when they found out they were pregnant, had less emotional support from their current partner and others, and reported lower positive coping with negative mood/affect.

Table 2 shows unadjusted estimates of main study variables with depressive symptomatology in order to examine the relationship between the main variables and depressive symptoms before adjusting for other factors likely to be associated with the outcome variable. Most independent variables were significantly associated with depressive symptoms, before inclusion of them in multivariate analyses, with the exception of employment status, receipt of public assistance, relationship status, and reproductive history. However, we retained variables that were non-significant in bivariate analyses, given that the relationship between these variables and the outcome may change when in conjunction with other variables in the model.

Multivariate Models

Table 3 shows the six linear regression models built to examine predictors of depressive symptoms at baseline among the overall sample. In Model 1 (i.e., basic model), only maternal age was entered as a predictor, given age is typically a confounder of various mental health outcomes, including depressive symptomatology (Rich-Edwards et al., 2006), and therefore we wanted to examine the relationship of maternal age and depressive symptoms without inclusion

of other predictors. We found that women who were 31 years of age or older compared to women 18-20 years of age, had higher levels of depressive symptoms. Even after adjusting for socioeconomic position variables (model 2), maternal age continued to be a significant risk factor of depressive symptoms, with women 31 years of age or older compared to women 18-20 years of age still having significantly higher levels of depressive symptoms. Moreover, women with at least a high school degree/GED had lower levels of depressive symptoms when compared to women with less than a high school diploma. Further adjustment of interpersonal factors, including IPV and relationship status (model 3), reduced the associations between maternal age and education level with depressive symptoms, they remained statistically significant predictors. At the same time, greater levels of IPV related to higher levels of depressive symptoms even after adjusting for maternal age and socioeconomic position variables. Similarly, being widowed/divorced/separated was associated with greater levels of depressive symptoms when compared to women who were married/cohabiting.

We further adjusted for health behaviors (model 4; illicit drug use and alcohol use during pregnancy) and found that both were significant predictors of depressive symptoms. Specifically, illicit drug use and alcohol use were associated with increased depressive symptoms compared to no illicit drug use and no alcohol use during pregnancy. Accounting for these variables eliminated the associations between maternal age and education level with depressive symptoms. We further considered pregnancy-related factors (e.g., reproductive history, pregnancy intention, and happiness about pregnancy) in Model 5, and found that women who had no previous live births and only loss, were more likely to have greater levels of depressive symptoms as compared to women who had previous live births and no pregnancy loss. Likewise, being very happy about pregnancy compared to being unhappy about pregnancy was associated with

decreased depressive symptoms. Pregnancy intention was not significantly associated with depressive symptoms after adjustment of all other variables. Adjustment for pregnancy-related variables dampened the association between alcohol use and depressive symptoms, but did not eliminate it, whereas adjustment for these variables made the association between maternal age (i.e., being 31 years of age or older) and depressive symptoms significant again. Illicit drug use or alcohol use during pregnancy remained significant risk factors, and IPV also remained a significant risk factor for depressive symptoms.

In the final model we added coping resources (i.e., emotional support from others, emotional support from current partner, and cognitive-behavioral coping with negative mood and affect), and found emotional support from others and positive cognitive-behavioral coping strategies significantly related to decreased depressive symptoms. Emotional support from current partner, on the other hand, was not a significant predictor of depressive symptoms. Given that women who experience IPV are less likely to experience emotional support from their partners, we tested the sensitivity of our results (i.e., whether the estimates from the relation between emotional support from current partner and depressive symptoms would change) when stratified by women who had experienced IPV from their current partner versus those who did not report any intimate partner violence. This did not change the results; the estimates remained virtually the same and non-significant between both groups (data not shown). As such, we report the estimates by the total sample. Additionally, maternal age (21-25 years and being 31 years of age or older), IPV, health behaviors (drug and alcohol use), reproductive history (no live birth/only loss and no live birth/no loss), and being unhappy about pregnancy all remained significant risk factors of depressive symptoms after adjusting for coping resources.

Discussion

The goal of our study was to determine whether measures across multiple domains of influence would predict depressive symptoms among urban, high-risk pregnant African American women in Washington, D.C. Our study documents associations between demographics, interpersonal factors, health behavior, pregnancy-related factors, and coping resources with depressive symptoms. We did not find associations between any of our socioeconomic position variables and depressive symptoms after adjusting for health behaviors, pregnancy-related factors, and coping resources.

Maternal age range of 21-25 and greater than 31 years was associated with increased depressive symptoms after adjustment of all other variables in the final model compared to being in the 18-20 maternal age range. Our findings are somewhat consistent with other studies that find that depressive symptoms increase with maternal age (Rich-Edwards et al., 2006), though we did not find that those in the 26-30 maternal age range were at a significantly higher risk of increased depressive symptoms.

When introducing socioeconomic position variables (e.g., education, employment, receipt of public assistance), we found that having a high school diploma/GED was associated with lower depressive symptoms compared to those with less than a high school degree, adjusting for demographics and other SES variables. Our finding that work status was not associated with depression corroborates with other studies conducted with low-income, African American pregnant women (Hobfoll et al., 1995). Indeed, it may be that the lack of variance in work status among pregnant women (e.g., most women are not working) could partly account for the non-significant association. Whereas a number of studies have found an association between socioeconomic status (primarily education and income) and depression among pregnant African American women (Zayas et al., 2002), fewer studies have assessed the relation between receipt

of public assistance and depressive symptoms, particularly in multivariate analyses. Thus, our non-significant association between public assistance and depressive symptoms may be partly attributed to the fact that most studies have only assessed this association in bivariate analysis; thus, not taking into account other variables or confounders in the same model. Notwithstanding, we found high rates of moderate-to-severe depressive symptoms among public assistance recipients (62.20%), and more women who met the HSCL cutoff for moderate-to-severe depressive symptoms received public assistance, although the rates did not differ significantly by group. Past research finds that low-income women who receive public assistance show high rates of depressive symptoms and have higher rates of depressive symptoms compared to their non-public assistance-receiving counterparts, though not always statistically significantly different from each other (Lennon, Blome, & English, 2001). The association between public assistance as an SES proxy and depressive symptoms warrants further study.

Both IPV and relationship status have been regarded as important risk markers for increased depressive symptoms (Bacchus, Mezey, & Bewley, 2004; Rich-Edwards et al., 2006). Indeed, Campbell et al. (2002) notes that intimate partner femicide and near fatal intimate partner femicide remain leading causes of premature death as well as of disabling injuries and conditions among African American women. However, there is a paucity of research that examines the association between IPV and depressive symptoms relative to relationship status, particularly among pregnant women, despite that some studies have found these factors to co-occur (Bacchus et al., 2004; Martin et al., 1996;). Whereas most research on depression finds a robust relation with being widowed/divorced/or separated, we found that this association was only significant before inclusion of health behaviors, pregnancy-related factors, and coping resources. That is, being widowed/ divorced/or separated did not remain a risk factor of depressive symptoms when

other risk as well as protective factors were included in the models. On the other hand, we found that greater levels of IPV were associated with increased depressive symptoms, and showed the strongest association out of all of the risk factors, even after adjusting for all other risk and protective factors in the model. Importantly, consistent with other studies on poor, urban, women of color (Amaro et al., 1990), we found that compared to non-depressed women, women in the moderate-to-severe depressive symptoms' category were significantly more likely to have experienced IPV. It is possible that the causal pathway is that women experiencing IPV are more likely to be depressed rather than the converse.

These findings lend support to considering the context of high-risk African American women's lives, such that these results highlight the importance of also attending to relational and not just individual factors that may put this group at an even higher risk for poor psychological well-being and pregnancy outcomes. Intimate partner violence is a public health concern among pregnant women in vulnerable social positions, and therefore, the need for tailoring and testing culturally focused interventions that specifically target African American women with greater social vulnerability, including those who are at risk for experiencing IPV during pregnancy, is certainly warranted. At the same time, equally needed are interventions that target the perpetrators themselves in an effort to potentially reduce the occurrence of IPV (Lee et al., 2002). Likewise, in a clinical care setting, clinicians should screen for stressors among pregnant women during their patients' clinic visits, and inquire about these stressors, including women's and children's safety, during follow-up visits (Barbee, 1992; Warren, 1995). This can hopefully open the opportunity for women to feel comfortable to talk through their stressors and obtain assistance related to their most pressing issues, including IPV if this is one of their concerns, given that women of color in general are less likely to report and seek help for IPV (Lee et al.,

2002). Significantly, Campbell (2002) notes the importance of also recognizing the strengths that battered women use, and the need for any intervention or program to be offered in the form of advocacy, while also respecting these women's autonomy.

Negative health behaviors such as alcohol and drug use have also been noted among pregnant women, and these behaviors have been shown to contribute to poor psychological well-being during pregnancy (Marcus, 2009; Martin et al., 1996). For example, McFarlane et al. (1996) found that almost 27% of predominantly low-income African American pregnant women reported using alcohol and illicit drugs. We found that using alcohol or illicit drugs during pregnancy was associated with increased depressive symptoms, after adjusting for other factors. Additionally, in our bivariate analysis, we found that women who fell into the moderate-to-severe depressive symptoms category were significantly more likely than non-depressed women to use alcohol or illicit drugs. Since we only used data from the baseline interview, we cannot ascertain the temporal ordering of this association; that is, whether depression led to alcohol and drug use as a coping mechanism for example, or whether the use of drugs and alcohol led to increased depressive symptoms. However, past studies have found that substance use is associated with depressive symptoms among pregnant women (Kelly, Zatzick, & Anders, 2001). Further, given that substance use during pregnancy is equally a public health concern as is depression, and that substance use and depression are likely to co-occur with IPV (Horrigan et al., 2000), future research would benefit from using path analysis as an analytic technique to examine the interrelationships between depression, substance use, and IPV among low-income pregnant African American women, who are at an increased risk for depression and substance use if they have experienced IPV (Amaro et al., 1990; Campbell, 20002).

There is a paucity of research on pregnant women that includes reproductive history and other pregnancy-related factors as predictors of depressive symptoms. Certainly, we found that factors in this domain (i.e., reproductive history and happiness about pregnancy) were associated with depressive symptoms after all model adjustments. That is, having no live births and only a loss, and having no live birth and no pregnancy loss were associated with increased depressive symptoms compared to women who had a previous live birth but no pregnancy loss. Being unhappy about the pregnancy was also associated with increased depressive symptoms when compared to women who reported being very happy about their pregnancy. Our findings highlight the relevance for considering protective factors such as coping resources that may help attenuate the psychological costs that are associated with poor reproductive history and affect regarding pregnancy.

Factors that may help decrease the chances of high-risk, African American women developing depressive symptoms include support systems and adaptive coping strategies. Consistent with other studies, we found that support from others was associated with decreased levels of depressive symptoms (Warren, 1997). Likewise, we found that more positive expectancies regarding the woman's ability to regulate her negative mood/affect was associated with decreased depressive symptoms. Interestingly however, we did not find emotional support from current partner to be associated with decreased depressive symptoms among our sample after model adjustments. It may be that support from others is a more reliable source of strength for these women, many of whom are single and/or have experienced IPV. However, our bivariate analyses showed that non-depressed women had significantly higher mean levels of emotional support from their partners and greater levels of adaptive coping with negative moods/affect than did women with moderate-to-severe depressive symptoms. Thus, it may be that given that

women who were classified with moderate-to-severe depressive symptoms report greater levels of risk factors (e.g., IPV, unhappiness about pregnancy, drug and alcohol use), these coping resources do not sufficiently buffer against the negative effects of multiple stressors on depressive symptoms, particularly among an already high-risk group of pregnant women. Indeed, even though emotional support from others and higher levels of adaptive cognitive/behavioral coping strategies were associated with decreased depressive symptoms, they did not completely offset the negative effects of most stressors present in the lives of the women in our sample. These findings therefore suggest that focusing on the different dimensions of stress that high-risk, pregnant African Americans face is of particularly importance in prevention efforts and of relevance for population health. Certainly, this is an area of research that merits further study.

Limitations and Future Application

As with other studies, ours is not without limitations. While we assessed various risk factors associated with depressive symptoms, our study did not include specific race-related stressors such as institutional or individual discrimination. Prior research with African American women has found that racism, particularly gendered racism, is a pervasive reality in the lives of these women (King, 2003), and that African American women compared to African American men, have been found to show greater levels of negative responses to racial incidents (Anderson, 1992). Indeed, this may have implications for psychological well-being as well as birth outcomes (Jackson, Hogue, & Phillips, 2005; Jackson et al., 2001; Nuru-Jeter et al., 2009). In fact, discrimination has been shown to be a robust predictor of mental health for African Americans (Williams, 2003). Thus, future research should include measures addressing African American's racial and gendered sources of stress in order to more adequately capture the multiple contexts in which African American women are socially located.

Further, our sample was comprised mostly of women on public assistance, thereby limiting our ability to generalize our findings to African American women with higher levels of socioeconomic status. Much of the burgeoning research on African American pregnant women has focused on urban, low-income women, and relatively less research has examined risk factors among middle and upper-class African American pregnant women. Indeed, it may be that risk and protective factors of depressive symptoms can be similar as well as different depending on the social class standing of an individual, partly as a function of the levels of stressors and resources available to them. Certainly, socioeconomic differences in risk and protective factors of depressive symptoms can have important implications to further understanding differences in birth outcomes among African American women of child-bearing age (Marcus, 2009; Nuru-Jeter et al., 2009). Lastly, although the purpose of our study was not meant to be nationally representative, we do acknowledge that our results are limited in their generalizability to similar populations of high-risk urban African American women. However, given the consistency of most of our findings with prior research, we believe that it is very likely that these same risk and protective factors of depressive symptomatology may hold among low-income African American women elsewhere in the United States.

Conclusion

Notwithstanding the aforementioned limitations, a key strength of our study was the large sample size that allowed room for adjusting for a number of potential predictors of depressive symptoms in the multivariate analysis. This enabled us to examine a range of risk and protective factors among a group that is at heightened risk of depression and poor pregnancy outcomes, but for whom there are not sufficient data to conduct similar types of analyses.

Future research should continue to focus and expand on the multiple mechanisms and pathways that may explain depressive symptoms among pregnant African American women. Indeed, this area is of particular relevance for the study of infant mortality, given that African American women have disproportionate levels of having poor birth outcomes. More detailed research is therefore needed to understand how both risk and protective factors influence psychological well-being, and the potential mediating pathways by which psychological well-being (i.e., depression) influence pregnancy outcomes among low-income African American women—a group who already faces disproportionate levels of health disparities and social and economic stressors. In conclusion, our study results suggest that we take a multi-faceted approach to examining predictors of depression among high-risk African American pregnant women.

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Table 1

Characteristics of All Participants and Bivariate Associations of Risk and Protective Factors with Depression Mean Score Cut-off Criteria

	Total Sample		Moderate-to-Severe Depressed Women		Non-Depressed Women		
	N= 1,044		N= 463		N= 581		
	Mean or %	n	Mean or %	n	Mean or %	n	*p* value
Demographics							
Maternal Age							n.s.
18-20	26.63%	278	25.49%	118	27.54%	160	
21-25	38.03%	397	38.23%	177	37.87%	220	
26-30	21.65%	226	21.60%	100	21.69%	126	
≥ 31	13.70%	143	14.69%	68	12.91%	75	
Socioeconomic Status							
Educational Level							*
Less than high school	30.27%	316	32.18%	149	28.74%	167	
High School/GED	46.55%	486	41.68%	193	50.43%	293	
At least some college	23.18%	242	26.13%	121	20.83%	121	
Employment Status							±
Working	36.53%	381	33.69%	156	38.79%	225	
Not Working	63.47%	662	66.31%	307	61.21%	355	
Missing	.1%	1					
Receives Public Assistance							n.s.
No	35.82%	374	36.07%	167	35.63%	207	
Yes	64.18%	670	63.93%	296	64.37%	374	
Interpersonal Factors							
Intimate partner violence	6.49	(.66)	11.04	(1.36)	2.87	(.42)	*******
Relationship Status							±
Married/cohabiting	23.66%	247	23.97%	111	23.41%	136	
Single	71.36%	745	69.33%	321	72.98%	424	
W/D/S	4.98%	52	6.70%	31	3.61%	21	
Health Behaviors							
Illicit drug use							***
No	88.22%	921	84.02%	389	91.57%	532	
Yes	11.78%	123	15.98%	74	8.43%	49	
Alcohol use							***
No	78.62%	820	72.14%	334	83.79%	486	
Yes	21.38%	223	27.86%	129	16.21%	94	
Missing	.1%	1					
Pregnancy-Related Factors							

Reproductive History							n.s.
Previous live births, no pregnancy loss[a]	42.43%	443	39.09%	181	45.09%	262	
Previous live birth & previous loss	25.38%	265	28.51%	132	22.89%	133	
No live birth, only loss	8.33%	87	8.64%	40	8.09%	47	
No live birth & no loss	23.85%	249	23.76%	110	23.92%	139	
Pregnancy Intention							n.s.
Intended	34.72%	360	31.22%	143	37.48%	217	
Mistimed	41.66%	432	43.89%	201	39.90%	231	
Unwanted	23.63%	245	24.89%	114	22.63%	131	
Missing	.7%	7					
Happiness about pregnancy							***
Very Happy	40.42%	422	34.34%	159	45.27%	263	
Moderately happy	39.94%	417	38.88%	180	40.79%	237	
Unhappy	19.64%	205	26.78%	124	13.94%	81	
Coping Resources							
Emotional support from others	40.08	(.46)	35.64	(.74)	43.62	(.54)	***
Emotional support from partner[b]	37.07	(.64)	33.90	(.94)	39.60	(.85)	***
Cognitive/Behavioral coping	58.72	(.30)	54.10	(.45)	62.40	(.34)	***

Note. ***p < .001; * p <.05, ±p <.10; n.s.= non-significant; W/D/S = Widowed/Divorced/Separated; [a] = excludes voluntary abortions; [b]= women who had no current partner were given a value of 0. T-tests of differences were computed for continuous variables; chi-square tests of difference were computed for categorical variables. Standard deviations of means for continuous variables are in parentheses.

Table 2

Unadjusted Regression Models of Risk and Protective Factors with Depressive Symptoms

	Depressive Symptoms
	B (SE B)
Demographics	
Maternal Age	
18-20	ref
21-25	1.27(1.10)
26-30	1.43(1.26)
≥31	3.87(1.44)**
Socioeconomic Position	
Educational Level	
Less than high school	ref
High School/GED	-3.22(1.01)**
At least some college	.50(1.19)
Employment Status	
Working	ref
Not Working	1.62(.72)±
Public Assistance	
No	ref
Yes	.48(.91)
Interpersonal Factors	
Intimate partner violence	.13(.02)***
Relationship Status	
Married/cohabiting	ref
Single	-1.17(1.03)
Widowed/Divorced/Separated	
Health Behaviors	
Illicit drug use	
No	ref
Yes	5.74(1.34)***
Alcohol use	
No	ref
Yes	6.10(1.05)***
Pregnancy-Related Factors	
Reproductive History[a]	
Previous live births, no pregnancy loss	ref
Previous live birth & previous loss	1.56(1.09)
No live birth, only loss	2.77(3.25)±
No live birth & no loss	.21(.68)
Pregnancy Intention	

Intended	ref
Mistimed	2.12(.100)*
Unwanted	1.96(1.16)±
Happiness regarding pregnancy	
Very Happy	ref
Moderately happy	1.33 (.95)
Unhappy	7.14(.97)***
Coping Resources	
Emotional support from others	-.26(.03)***
Emotional support from partner[b]	-.12(.02)***
Cognitive/Behavioral Coping	-70(.04)***

Note. ***p < .001; **p <.01; * p <.05, ±p <.10; [a]= excludes voluntary abortions; [b] = women who had no current partner were given a value of 0. Characteristics with no reference group are continuous; ref= reference group. Beta coefficients are unstandardized.

Table 3

Regression Analysis of Risk and Protective Factors of Depressive Symptoms among African American Pregnant Women: DC-HOPE Project

	Model 1		Model 2		Model 3	
	B(SE B)	**95% CI**	**B(SE B)**	**95% CI**	**B(SE B)**	**95% CI**
Demographics						
Maternal Age						
18-20	ref		ref		ref	
21-25	1.26(1.10)	[-.85, 3.51]	1.33(1.11)	[-.85, 3.51]	1.19(1.09)	[-.95, 3.33]
26-30	1.43(1.26)	[-.87, 4.11]	1.62(1.26)	[-.87, 4.11]	0.83(1.26)	[-1.64, 3.30]
≥ 31	3.87(1.44)**	[1.11, 6.81]	3.96(1.45)**	[1.11, 6.81]	3.09(1.46)*	[.22, 5.96]
SES Position						
Educational Level						
Less than high school			ref		ref	
High School/GED			-3.01(1.45)**	[-5.03, -.99]	-2.45(1.01)*	[-4.44, -.47]
At least some college			.69(1.27)	[-1.82, 3.20]	.81(1.25)	[-1.64, 3.26]
Employment Status						
Working			ref		ref	
Not Working			1.70(.95)±	[-.17, 3.57]	1.79(.93)±	[-.045, 3.62]
Public Assistance						
No			ref		ref	
Yes			.28(1.42)	[-1.62, 2.20]	-.06(.96)	[-1.93, 1.82]
Interpersonal Factors						
Intimate partner violence					.13(.02)***	[.09, .17]
Relationship Status						
Married/cohabiting					ref	
Single					-1.01(1.01)	[-3.00, .98]
W/D/S					4.37(2.12)*	[.20, 8.54]

Table 3 Cont'd

Regression Analysis of Risk and Protective Factors of Depressive Symptoms among African American Pregnant Women: DC-HOPE Project

	Model 4		Model 5		Model 6	
	B(SE B)	**95% CI**	**B(SE B)**	**95% CI**	**B(SE B)**	**95% CI**
Demographics						
Maternal Age						
18-20	ref		ref		ref	
21-25	1.24 (1.08)	[-.88, 3.36]	1.95 (1.12) ±	[-.26, 4.15]	2.12 (.10)*	[.156, 4.08]
26-30	.47 (1.25)	[-1.98, 2.92]	1.39 (1.33)	[-1.23, 4.00]	1.83 (1.19)	[-.49, 4.16]
≥ 31	2.51 (1.46)±	[-.35, 5.38]	3.08 (1.56)*	[.02, 6.14]	3.82 (1.39)**	[1.08, 6.55]
SES Position						
Educational Level						
Less than high school	ref		ref		ref	
High School/GED	-1.80 (1.01) ±	[-3.78, .166]	-1.88 (.99) ±	[-3.82, .062]	-1.03 (.88)	[-2.77, .70]
At least some college	1.19 (1.23)	[-1.25, 3.62]	.02 (1.26)	[-2.46, 2.50]	.81 (1.12)	[-1.40, 3.02]
Employment Status						
Working	ref	ref	ref		ref	
Not Working	1.54 (.93) ±	[-.28, 3.35]	1.52 (.91) ±	[-.27, 3.31]	.63 (.81)	[-.97, 2.23]
Public Assistance						
No	ref	ref	ref		ref	
Yes	-.08 (.94)	[-1.93, 1.78]	-.01 (.95)	[-1.89, 1.86]	.41 (.85)	[-1.26, 2.08]
Interpersonal Factors						
Intimate partner violence	.12 (.02)***	[.08, .16]	.12 (.02)***	[.08, .16]	.08 (.02)***	[.043, .11]
Relationship Status						
Married/cohabiting	ref	ref	ref		ref	
Single	-1.07 (1.00)	[-3.04, .90]	-1.47 (.10)	[-3.43, .49]	-1.32 (.92)	[-3.11, .48]
W/D/S	3.98 (2.10) ±	[-.14, 8.11]	3.97 (2.06) ±	[-.09, 8.02]	3.48 (1.85) ±	[-.142, 7.10]
Health Behaviors						
Illicit drug use						
No	ref	ref	ref		ref	
Yes	3.83 (1.35)**	[1.19, 6.48]	3.48 (1.33)**	[.87, 6.09]	2.42 (1.19)*	[.09, 4.75]
Alcohol use						
No	ref	ref	ref		ref	
Yes	4.10 (1.06)***	[2.02, 6.19]	3.86 (1.05)***	[1.79, 5.93]	3.24 (.94)**	[1.41, 5.08]
Pregnancy-Related Factors						
Reproductive History[a]						

Previous live births, no pregnancy loss	ref		ref	
Previous live birth & previous loss	.40 (1.05)	[-1.67, 2.46]	1.38 (.94)	[-.46, 3.22]
No live birth, only loss	4.59 (1.63)**	[1.38, 7.79]	4.41 (1.45)**	[1.60, 7.25]
No live birth & no loss	1.45 (1.20)	[-.90, 3.79]	3.40 (1.07)**	[1.29, 5.50]
Pregnancy Intention				
Intended	ref		ref	
Mistimed	.60 (1.10)	[-1.57, 2.77]	.82 (.98)	[-1.11, 2.75]
Unwanted	-1.85 (1.37)	[-4.53, .834]	-.90 (1.22)	[-3.30, 1.50]
Happiness about pregnancy				
Very Happy	ref		ref	
Moderately happy	1.31 (1.08)	[-.81, 3.43]	-.29 (.97)	[-2.19, 1.61]
Unhappy	7.59 (1.41)***	[4.84, 10.35]	4.26 (1.27)**	[1.76, 6.76]
Coping Resources				
Emotional support from others			-.13 (.03)***	[-.18, -.08]
Emotional support from partner[b]			-.03 (.02)	[-.07, .01]
Cognitive/Behavioral Coping			-.56 (.04)***	[-.64, -.47]

Note. [a]= excluding voluntary abortions; **[b]** = women who had no current partner were given a value of 0; ref= reference category; W/D/S = Widowed/Divorced/or Separated. Characteristics with no reference group are continuous. Beta coefficients are unstandardized.
***p < .001; **p <.01; * p <.05, ±p <.10