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The Impact of Symptoms of Depression and Walking on Gestational Age at Birth in African American Women

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A B S T R A C T

Background: Symptoms of depression have been related to lower gestational age and preterm birth (<37 completed weeks gestation). Leisure time physical activity may have protective effects on preterm birth; however, less has been published with regard to other domains of physical activity such as walking for a purpose (e.g., for transportation) or the pathways by which symptoms of depression impact gestational age at birth.
Methods: This was a secondary analysis of available data of African American women. Women were interviewed within 3 days after birth. We proposed a model in which walking for a purpose during pregnancy mediated the effects of symptoms of depression (measured by the 20-item Center for Epidemiologic Studies-Depression [CES-D] scale) on gestational age at birth in a sample of 1,382 African American women.
Results: Using structural equation modeling, we found that the direct effect of CES-D scores of 23 or greater, which have been correlated with major depression diagnosis, on gestational age at birth was -4.23 ($p < .001$). These results indicate that symptoms of depression were associated with a decrease in gestational age at birth of 4.23 days. Walking for a purpose mediated the effect of CES-D scores of 23 or greater on gestational age at birth.
Conclusions: Compared with African American women without symptoms of depression, African American women who had symptoms of depression walked less for a purpose during their pregnancy and delivered infants with lower gestational age at birth. If not medically contraindicated, clinicians should incorporate walking as part of prenatal care recommendations and reassure women about safety of walking during pregnancy.

Preterm birth (<37 completed weeks gestation) rates in the United States have remained much higher than rates in other developed countries. Rates are particularly high for African American women, who experience preterm birth at rates nearly double that of White women (13.3% vs. 8.9% in 2014; Hamilton, Martin, Osterman, Curtin, & Mathews, 2015). Researchers have struggled to identify ameliorable factors that could reduce the risk of preterm birth. A notable exception has been physical activity. A growing body of research suggests that physical activity has a protective effect on risk of preterm birth and this may occur by decreasing symptoms of depression, a risk factor for preterm birth. We review briefly below what is known about pregnant women's symptoms of depression, physical activity, the relationship between them, and the pathway from both to preterm birth. Because our study sample was exclusively African American, we also note issues particular to this very high risk group of women.

Symptoms of depression are prevalent among pregnant women. Two meta-analyses of studies conducted in different countries including the United States reported depression prevalence rates during pregnancy ranging from 7% to 13% (Bennett, Einarson, Taddio, Koren, & Einarson, 2004; Gavin et al., 2005). Specific to the United States, individual studies suggest that pregnant African American women report more symptoms of depression than pregnant non-Hispanic White women (Holzman et al., 2006; Mustillo et al., 2004; Seng, Kohn-Wood, McPherson, & Sperlich, 2011). In fact, Orr, Blazer, and James (2006) found that up to 50% of pregnant African American women reported experiencing symptoms of depression. Symptoms of depression have been linked to negative birth

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outcomes, including lower gestational age at birth and preterm birth, in the general population (Grote et al., 2010) and in African American women specifically (Giurgescu, Engeland, & Templin, 2015; Misra, Strobino, & Trabert, 2010).

The American Congress of Obstetricians and Gynecologists (ACOG) (ACOG, 2002, 2009) and the American Dietetic Association (ADA; Kaiser, 2008) recommend that pregnant women who do not have medical or obstetric conditions that might limit physical activity should incorporate 30 minutes or more of moderate physical activity appropriate for pregnancy on most, if not all, days of the week. Despite this recommendation, and in contrast with symptoms of depression, physical activity is not very prevalent among pregnant women in the United States (Evenson & Wen, 2010). Furthermore, based on the 2003 through 2006 National Health and Nutrition Examination Survey, rates of moderate to vigorous leisure time physical activity were significantly lower among minority pregnant women and this group was much less likely to meet recommendations for physical activity (Evenson & Wen, 2010). Data from the 2000 through 2009 Behavioral Risk Factor Surveillance Survey are consistent with this report; pregnant African American women were found to be less likely to engage in leisure time physical activity compared with pregnant White women (Zhao et al., 2012). Walking has been reported as the most common leisure time physical activity among pregnant women (Evenson, Savitz, & Huston, 2004). Less has been published with regard to other domains of physical activity, such as walking for a purpose (e.g., for transportation). Results from the National Household Travel Survey demonstrated that racial and ethnic minority populations, those with low income, and those living in urban areas were more likely to spend at least 30 minutes per day walking to and from public transportation (Besser & Dannenberg, 2005). Walking for a purpose is likely a relevant physical activity domain for African American women, particularly those with low incomes.

Leisure time physical activity may have protective effects on preterm birth (Berkowitz, Kelsey, Holford, & Berkowitz, 1983; Domingues, Barros, & Matijasevich, 2008; Domingues, Matijasevich, & Barros, 2009; Evenson et al., 2004; Hegaard et al., 2008; Juhl et al., 2008; Jukic et al., 2012; Leiferman & Evenson, 2003). However, research specifically focused on the relationship between walking for a purpose and preterm birth in African American women is limited and the results are inconclusive. In a prior study of low-income African American women in Baltimore, the researchers found an increased odds of preterm birth for women who walked for a purpose 4 days or more per week (Misra, Strobino, Stashinko, Nagey, & Nanda, 1998). In contrast, another study in the same city (different institution) reported that African American women who walked for a purpose for more than 30 minutes per day during pregnancy had lower risk of preterm birth (Sealy-Jefferson, Hegner, & Misra, 2014). Misra et al. (1998) defined walking for a purpose as the average number of days per week in the first and second trimesters combined that a woman spent walking for a purpose and did not collect duration of walking for a purpose (i.e., minutes per day). In contrast, Sealy-Jefferson et al. (2014) asked open-ended questions about the duration of walking for a purpose (minutes per day), which may have decreased recall bias. Duration of walking for a purpose (minutes per day) may be a better measure to use when examining the association between walking for a purpose and gestational age at birth.

There is a growing body of literature supporting associations between reductions in symptoms of depression with leisure time physical activity during pregnancy (Daley et al., 2014) as well as evidence of a link between symptoms of depression and risk of preterm birth (Grote et al., 2010). However, the potential mediating role of walking on the association of symptoms of depression with gestational age at birth has not been examined. We hypothesize that walking for a purpose is in the pathway between symptoms of depression and gestational age at birth, and may explain associations between symptoms of depression and earlier gestational age at birth. Although women who are depressed may lack the energy to engage in activity, walking for a purpose may be necessary, which may make it a particularly salient activity to examine to understand the pathways. Therefore, the purpose of this study was to examine whether walking for a purpose mediated associations between symptoms of depression and gestational age at birth in African American women. We hypothesize that women who had symptoms of depression walked less for a purpose and had a lower gestational age at birth.

Materials and Methods

Design and Sample

This present study is a secondary analysis of a retrospective cohort study of African American women participating in the Life-course Influences on Fetal Environments (LIFE) study conducted in the Detroit Metropolitan area (Giurgescu, Misra, et al., 2015; Sealy-Jefferson, Giurgescu, Helmkamp, Misra, & Osypuk, 2015). Women were included in the LIFE study if they self-identified as Black or African American, were 18 to 45 years of age, and were within 3 days postpartum. Women were excluded if they 1) did not understand English, 2) had serious cognitive deficits or significant mental illness on the basis of history or any prior records, or 3) were currently incarcerated. Women were recruited from Labor and Delivery and Postpartum units of a Detroit suburban hospital from June 2009 to December 2011. The main purpose of the original study was to examine the impact of racism on preterm birth for African American women. A description of the methods for this study is provided in detail elsewhere (Giurgescu, Misra, et al., 2015; Sealy-Jefferson et al., 2015). The symptoms of depression scale was administered at enrollment with an indicated recall period of the past week and the walking for a purpose question was administered in the same interview with the recall period of the entire pregnancy. The final study sample included 1,411 women, which represented 71% of the women approached for study participation. A sample of 1,383 women (98% of the interviewed sample) had symptoms of depression data available for this secondary data analysis. Owing to the very low rate of missing data for CES-D ($n = 23$), we excluded these participants from this secondary data analysis rather than imputing their CES-D data. One woman did not have data available for gestational age at birth. The analytic sample included 1,382 women who had data available for symptoms of depression and gestational age at birth.

Measures

Symptoms of depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) measures the presence of salient symptoms of depression within the past seven days (e.g., bothered by things more than usual, felt lonely). The CES-D has 20 items each rated on a 4-point scale referring to frequency of symptoms (0 [rarely],