

Examining Beliefs, Behaviors, and Provider Counseling on Physical Activity During Pregnancy: A Cross-Sectional Study in the Southern United States

Christiana C. Rebelle, PhD, Shannon L. Jette, PhD, John Michael Mills, BS,
Rachel A. Tinius, PhD

Physical inactivity, obesity, and chronic disease rates are high among pregnant women in the Southern United States. This study aimed to understand the beliefs and behaviors of women in the South regarding physical activity (PA) during pregnancy and whether provider counseling was associated with these beliefs and behaviors. The study included 292 women from the South who completed an online survey, providing sociodemographic data and recalling their health beliefs and PA during pregnancy. Descriptive statistics and correlation analyses were used to describe and assess the relationships between variables. The study found that feeling tired and lacking motivation were common barriers to PA, while improved health was the main benefit. The participants felt most susceptible to anxiety and depression. Providers were the primary source of support for PA, but provider counseling was not significantly correlated with increased PA. Participants engaged mostly in light household and caregiving activities. Sociodemographic factors had a stronger association with

The authors have no relevant financial or non-financial interests to disclose. **Dr. Rebelle** is a prenatal health educator and Editor-in-Chief of *JOPPPAH*. **Dr. Jette** is an associate professor and the director of graduate studies in the kinesiology department at the University of Maryland School of Public Health. **Mr. Mills** is a medical student at the University of Kentucky College of Medicine, Bowling Green Campus. **Dr. Tinius** is a certified exercise physiologist and an associate professor in Exercise Science at Western Kentucky University. This is an updated article of previously published research (Rebelle et al., 2022). Address all correspondence to Christiana Rebelle, christianarebelle@gmail.com

beliefs and behaviors than provider counseling. The study suggests that provider counseling should be enhanced with established techniques such as motivational interviewing to support PA.

Keywords: physical activity, pregnancy, south, provider counseling, health beliefs

Physical inactivity is a primary contributor to cardiovascular disease (CVD), diabetes, cancer, and mortality, as reported by the World Health Organization (WHO, 2020). Despite extensive research highlighting the benefits of prenatal physical activity (PA) and the importance of healthy gestational weight gain (GWG) during pregnancy, only 10% to 15% of women achieve the recommended level of PA (Garland, 2017; Newton & May, 2017; Santo et al., 2017). This low adherence to PA guidelines is concerning, especially in the context of increasing maternal morbidity and mortality rates in the United States, which are linked to rising obesity rates, chronic medical conditions, and cesarean deliveries (Chinn et al., 2020; Hirshberg & Srinivas, 2017).

Excess GWG can lead to long-term obesity, metabolic dysfunction, and CVD for both mother and baby, making it a significant concern in maternal health (Subhan et al., 2019; Berggren et al., 2016). Recent studies suggest that PA during pregnancy can help prevent CVD, highlighting the need for pregnant women to be informed about the health risks of inactivity and the benefits of PA (Collings et al., 2020; Vyas et al., 2019).

PA during pregnancy is not only crucial for managing GWG but also offers additional benefits such as reducing anxiety and blood pressure, improving neonatal outcomes, and decreasing the risk of cesarean section (Baena-Garcia et al., 2020; Yan et al., 2020). Furthermore, PA can reduce insulin resistance, the risk of gestational diabetes, and systemic inflammation (Tinius et al., 2017; Wang et al., 2017). Despite these benefits, counseling on PA is often limited and not aligned with national guidelines, though many pregnant women express a desire for clear and specific guidance (Harrison et al., 2019; Lott et al., 2019; Whitaker et al., 2019).

In the Southern United States, where physical activity levels are lowest and rates of overweight and obesity, as well as chronic health conditions, are highest, sociodemographic factors may influence beliefs and behaviors

regarding PA during pregnancy (CDC, 2021). Understanding these factors is crucial for promoting healthy behaviors and reducing chronic disease. Despite the potential benefits, PA during pregnancy remains uncommon, and there are significant barriers to effective counseling by providers, including lack of time, patient attitudes, and accessibility to resources (Murray-Davis et al., 2020).

Given the low levels of PA and high rates of chronic disease in the South, examining how sociodemographic factors and provider counseling are related to PA beliefs and behaviors may provide valuable insights to improve provider messaging and patient outcomes. This retrospective cross-sectional correlational study aims to address these issues by examining 1) sociodemographic factors related to beliefs and behaviors regarding PA during pregnancy in the South and 2) whether women's beliefs and behaviors during pregnancy are associated with provider counseling.

Methods

The study analyzed a cross-sectional predictive correlational study evaluating PA during pregnancy in the Southern United States (as defined by the United States Bureau of the Census, 1995) and Washington, DC. The study utilized the Health Belief Model as the theoretical framework. The anonymous and voluntary online sample was recruited via Qualtrics from June 2021 through August 2021 using an open online survey. The final sample broadly represented recently pregnant women throughout the South, including women from every southern state. Participants were eligible for inclusion if they were at least 18 years of age at the start of their last pregnancy beginning in 2016 or later, identified as a cisgender woman, lived and gave birth in the South, and had an uncomplicated pregnancy. Each participant signed an online consent. Participants were allowed to terminate the survey, although incomplete surveys were not included in the final data. Although retrospective self-reported data is prone to error or recall bias, studies have shown that recalling information from past pregnancies may be less susceptible (Carter et al., 2015; Chin et al., 2017; Headen et al., 2017). Additionally, the broad sample reduced the risk of homogeneity, which can be present in self-selecting samples from specific locations. Institutional Review Board approval was obtained before all data collection (IRB-2021-3551).

G*Power (Faul et al., 2009) analysis determined that a minimum sample size of $n=184$ provided ample power (.95) to establish significant associations

at a .05 α -level and medium effect size ($f = .15$). All analyses were conducted using Statistical Package for the Social Sciences V28 (SPSS Inc., Chicago, IL).

Protocol

In the analysis, the criterion variables included beliefs (perceived barriers and benefits of PA, perceived susceptibility to health conditions, and exercise self-efficacy) and behaviors (PA (light and above) and sedentary activity) during pregnancy. Beliefs were measured using the Health Belief Model Scales for adult physical activity (Hayslip et al., 1996) and the Physical Exercise Self-Efficacy Scale (Schwarzer & Renner, 2005). Beliefs were measured on ordinal Likert scales and treated as continuous variables. Although this method has some debate, using Likert data on interval scales in parametric testing is an accurate and robust method of analysis (Meyers et al., 2016). The behavior variables were measured retrospectively using the Pregnancy Physical Activity Questionnaire (PPAQ) (Chasan-Taber et al., 2004) with permission from the author. The original authors showed each instrument to be valid and reliable (Chasan-Taber et al., 2004; Hayslip et al., 1996; Schwarzer & Renner, 2005). The PPAQ measured the overall intensity (light, moderate, and vigorous) of PA during pregnancy across four categories (household/caregiving, occupational, sports/exercise, transportation) and sedentary activity. In this article, PA includes all four activity categories, while exercise refers to the single subcategory of sports/exercise.

For this study, provider counseling was defined as provider advice (yes or no) and means from two subscales of the Health Belief Model Scales, including provider cue to action and provider support for PA. Participants were asked whether their provider's recommendation was a major reason for starting exercise (cue to action) and a source of influence or approval (support). Women responded on a 1-5 scale, from strongly disagree to strongly agree. The initial study reported Cronbach's alphas for the Health Belief Model Scales and PPAQ, showing excellent reliability ranging from .80 to .93 (Rebelle, 2022).

We included several a priori sociodemographic factors that have been shown to confound PA beliefs and behaviors in previous studies, including age, BMI, race and ethnicity, education, household income, parity, marital status, exercise before pregnancy, and perceived health status during pregnancy. A detailed description of these variables was included in the initial study (Rebelle, 2022). Self-reported race and ethnicity data were a series of dichotomous

variables consisting of non-Hispanic American Indian or Alaska Native, non-Hispanic Asian or Pacific Islander, non-Hispanic Black, Hispanic, non-Hispanic White, and participants that identified as other or multiracial. With just 1% of the total responses, American Indian or Alaska Native was merged with other or multiracial in the regression models and used as the reference.

Statistical Analysis

For the secondary analysis, descriptive statistics were used to create a detailed profile of the sample. We also examined the subscales of the instruments to identify participants' most salient beliefs, types and intensities of PA, and accompanying sociodemographic factors to determine the sociodemographic factors related to beliefs and behaviors of women in the South regarding PA during pregnancy. Because several sociodemographic variables were not normally distributed, we performed 2-tailed Spearman's rho correlations to assess the relationships among the interval and ordinal variables. Point-biserial correlations were used when one of the variables was dichotomous.

To address the secondary aim, we assessed correlations to examine the associations between provider counseling and participants' beliefs and behavior during pregnancy. The Health Belief Model stipulates that beliefs must be considered in the context of individual factors. For this reason, pertinent sociodemographic factors were chosen a priori because of their frequency in prenatal PA literature (see Table 1). Additionally, the sociodemographic factors accurately reflect the diversity of patients in the South that prenatal care providers are expected to counsel during pregnancy.

Results

Of the 292 survey responses, there were no other missing data points. Outliers were left in the analysis as they were within range of the multiple-choice survey selections. Participants' BMI was calculated using self-reported height and weight at the onset of pregnancy, with 50% considered overweight or obese and 15% underweight.

Table 1*Sociodemographic Statistics (N = 292)*

Characteristic	Mean±SD or n (%)
Age(y) at start of last pregnancy	29.5±5.8
BMI at start of last pregnancy	26.3±6.5
Race/Ethnicity	
American Indian or Alaska Native	3 (1.0)
Asian or Pacific Islander	17 (5.6)
Black	45 (14.8)
Hispanic	43 (14.1)
Non-Hispanic White	172 (56.4)
Other/Multiracial	25 (8.2)
Education	
Less than high school or GED	8 (2.7)
High school graduate or GED	58 (19.9)
Some college	58 (19.9)
2-year degree/Associate's degree	39 (13.4)
4-year degree/Bachelor's degree	86 (29.5)
Graduate degree	43 (14.7)
Annual household income	
Less than \$10,000	21 (7.2)
\$10,000 - \$19,999	15 (5.1)
\$20,000 - \$29,999	21 (7.2)
\$30,000 - \$39,999	41 (14.0)
\$40,000 - \$49,999	24 (8.2)
\$50,000 - \$59,999	29 (9.9)
\$60,000 - \$69,999	17 (5.8)
\$70,000 - \$79,999	22 (7.5)
\$80,000 - \$89,999	20 (6.8)
\$90,000 - \$99,999	14 (4.8)
\$100,000 - \$149,999	53 (18.2)
More than \$150,000	15 (5.1)
Parity	
1	126 (43.2)
2	101 (34.6)
3	44 (15.1)

Characteristic	Mean±SD or n (%)
4 or more	21 (7.2)
Marital status	
Separated/Divorced/Widowed/Never married	54 (18.5)
Married/Living with partner	238 (81.5)
Exercise before pregnancy	
Less than 150 mins of exercise per week	190 (65.1)
150 mins or more of exercise per week	102 (34.9)
Health status during your last pregnancy	
Excellent	73 (25.0)
Very good	112 (38.4)
Good or average	81 (27.7)
Fair	19 (6.5)
Poor	7 (2.4)
Advice about physical activity from prenatal health provider	
Yes	192 (65.8)
No	100 (32.4)

Descriptive statistics revealed similar beliefs among the sample, with few notable exceptions (Table 2). Most participants agreed that being too tired was their primary barrier to PA. Women in the study perceived many benefits to PA, with the overarching benefit of improved health; however, nearly all the activity among the sample was incidental rather than a conscious decision to exercise. Participants engaged in primarily light activity during pregnancy, resulting from household and caregiving (57.3%) and more moderate levels of occupational (26.8%) and transportation (11.9%) activities.

Women in the study perceived their health through their prenatal experience rather than through long-term health concerns. Participants felt most susceptible to psychological health threats. For example, most believed they were more susceptible to anxiety (183, 62.7%) and depression (153, 52.4%) during pregnancy while perceiving themselves as less susceptible to inactivity (106, 36.3%) or obesity (103, 35.3%), even though the sample engaged in little exercise and half were in the overweight or obese category at the onset of

pregnancy. Fewer considered themselves at risk of diabetes (103, 35.3%), heart attack (71, 24.4%), or stroke (54, 18.5%).

Although participants had many areas of high agreement, some perceptions varied based on sociodemographic factors. For women categorized as obese, perceived susceptibility was more physical, e.g., feeling stiff and sore, than psychological. Among non-Hispanic Black women, reducing the risk of heart attack was perceived as the greatest benefit of PA; however, just 19% felt personally susceptible to a heart attack (see Table 2).

Table 2*Salient Beliefs*

Beliefs	N (%) N = 292
Barriers	
Too Tired	247 (88.6)
Lack of Motivation	219 (75.0)
Too Lazy	175 (59.9)
Not Enough Time	149 (51.0)
Benefits	
Improved Health	258 (88.3)
Releasing Tension	233 (79.8)
Feeling Better Psychologically	229 (78.4)
Sense of Accomplishment	229 (78.4)
Increasing Mental Alertness	214 (73.3)
Getting Stronger	200 (68.5)
Reduced Risk of Heart Attack†	32 (76.2)
Cues to Action	
Not Fitting Comfortably in Clothing	154 (53.3)
Shortness of Breath	133 (45.6)
Provider Recommendation	126 (43.2)
Support from Others	
Provider	116 (39.7)
Spouse/Partner	108 (37)
Susceptibility	
Anxiety	183 (62.7)
Depression	153 (52.4)
Stiffness and Soreness††	82 (56.2)
High Blood Pressure††	77 (52.8)

Data are *n* (%) of agreeance among the total sample unless noted otherwise

†High level of agreeance only among participants that identified as Non-Hispanic Black, *n* = 45

††High level of agreeance only among participants categorized as overweight or obese, *n* = 146

The leading cues to action for PA were intrapersonal. Not fitting comfortably into clothing ranked highest, particularly among participants categorized as overweight or obese (96, 65.7%). The primary interpersonal cue to action was a provider's recommendation for PA. Perceived support for PA was generally low, yet participants agreed that providers were their main source of support for PA (116, 39.7%), the highest among non-Hispanic Black women (22, 52.4%).

Two-tailed Spearman's rho and point-biserial correlations showed that women were more likely to rate their healthcare providers as a primary source of support if they had received a provider cue to action ($r_s = .462$, $p < .001$) or provider advice ($r_{pb} = .330$, $p < .001$) for PA. Moreover, participants perceived a slight increase in the benefits of PA if they received provider counseling (advice: $r_{pb} = .130$, $p = .026$; cue to action: $r_s = .264$, $p < .001$; support: $r_s = .179$, $p = .002$). Although provider counseling was positively correlated with beliefs, the analysis showed that counseling was not significantly correlated with any type or intensity of PA during pregnancy. The only significant correlation between provider counseling and behavior was a small increase in sedentary behavior (advice: $r_{pb} = .160$, $p = .006$; cues to action: $r_s = .153$, $p = .009$; support: $r_s = .169$, $p = .004$).

Further examination showed that sociodemographic factors had stronger correlations with beliefs and behaviors during pregnancy than provider counseling, with exercise before pregnancy as a leading factor. Participants who reported pre-pregnancy exercise were more likely to exercise during pregnancy, perceived less fatigue, and had higher motivation for exercise than those who were less active (Table 3). The analysis also showed that feeling tired and unmotivated during pregnancy correlated with decreased self-efficacy for exercise ($r_s = -.271$, $p < .001$; $r_s = -.383$, $p < .001$), which may make it more difficult to begin exercise during pregnancy compared to maintaining or increasing pre-pregnancy activity levels.

Table 3*Sociodemographic Factors Associated with Beliefs and Behaviors*

	Exercise Before Pregnancy†	Income ††	Educational ††	Hispanic †	Non-Hispanic Black†	Non-Hispanic White †
Barriers	-.276**	-.188**	-.229**	-.034	-.079	.031
Benefits	.276**	.035	.161*	-.003	.107	-.050
Susceptibility to Serious Health Problems	-.141*	-.114	-.135*	-.080	-.168*	.162
Self-Efficacy	.186**	.014	.130*	-.037	.053	-.063
Exercise/Sport Activity	.363**	.045	.039	.072	-.064	.028
Household/Care-giving Activity	-.065	-.123*	-.161**	.147*	-.049	-.140
Occupational Activity	-.065	.102	.115*	.080	.014	.000
Transportation Activity	-.031	.021	-.024	.055	.155*	-.097
Sedentary Behavior	-.017	-.222**	-.103	.076	.224**	-.266**

†Data are two-tailed point-biserial correlation (r_{pb}) coefficients††Data are two-tailed Spearman's correlation (r_s) coefficients* $p < 0.05$, ** $p < 0.01$

Discussion

We conducted an in-depth examination to uncover the impact of sociodemographic factors on salient beliefs and behaviors regarding PA during pregnancy among women in the South and the association of provider counseling. The descriptive statistics showed that there was a large agreement among participants. Women in the study perceived a broad range of general benefits of PA and agreed on two prominent barriers: feeling too tired and unmotivated. This finding aligns with many studies that have shown fatigue to be a prevalent barrier to PA during pregnancy (Chang et al., 2015; Downs et al., 2015; Grenier et al., 2021; Kirkwood & Leicht, 2019; Nagourney et al., 2019; Swift et al., 2017; Sytsma et al., 2018). Though PA increases energy during

pregnancy, patients are often unaware of this benefit and believe exercise will increase their fatigue (Melton et al., 2016; Tinius et al., 2020).

Participants perceived themselves as most susceptible to mental health threats and lacked specific knowledge about their susceptibility to other chronic health conditions such as diabetes and heart disease. These conditions are leading causes of pregnancy-related morbidity and mortality (CDC, 2018; CDC, 2019) in the United States, with overweight, obesity, and inactivity as common antecedents. Most women perceived themselves as susceptible to anxiety and depression and viewed PA as a way to release tension and feel better psychologically. This finding aligns with recent studies that have described anxiety and depression as growing concerns among pregnant women (Basu et al., 2021; Liu et al., 2021). Additionally, providers in the South have reported an increase in pregnant patients' anxiety and negative mental health outcomes (Nagpal et al., 2021). To address patients' primary perceived barriers and susceptibility, providers should encourage moderate-intensity exercise to decrease fatigue and improve mental health during pregnancy.

Sociodemographic factors were most associated with beliefs and behaviors, with exercise before pregnancy informing beliefs more than any other variable. Women who exercised before and during pregnancy reported feeling less tired and more motivated to exercise. However, most participants obtained light PA from the daily necessities of household and caregiving rather than exercise. This finding is concerning because household and caregiving activities do not offer the same health benefits as exercise during pregnancy and can contribute to adverse health effects such as poor sleep quality (Hawkins et al., 2019), while even low levels of exercise can offer improved sleep and health benefits during pregnancy (Baker et al., 2018; Rodriguez-Blanke et al., 2018).

The examination of provider counseling's association with beliefs and behaviors regarding PA during pregnancy revealed that providers were participants' main source of support, and counseling was positively perceived. However, provider counseling was not associated with increased PA. Conversely, provider advice predicted a slight increase in sedentary behavior in the regression models. This finding suggests that patients either did not follow provider advice to engage in PA or were advised to decrease activity during pregnancy. Studies report that women are often advised to restrict activity or go on bed rest even though it is not recommended (McGee et al., 2018; Whitaker et al., 2019).

Our findings also align with previous studies that found pregnant patients positively perceive provider counseling on PA (Harrison et al., 2019; Heim et al., 2019; Whitaker et al., 2016) and often initiate it (Whitaker et al., 2019); however, provider counseling on PA and behavior change is often ineffective (Blankenship et al., 2020; Chana & Haith-Cooper, 2019), highlighting the need for evidence-based counseling methods. The COVID-19 pandemic further decreased the time and energy providers have available for counseling patients, with many providers stretched to burnout (Bradford & Glaser, 2021).

This study has many strengths, including a diverse, well-powered sample of participants, which provided a broad representation of recently pregnant women and generalizability to pregnant women in the South. Moreover, the multifaceted quantitative analysis allowed for an in-depth examination of participants' beliefs and behaviors and the impact of provider counseling.

The study also had limitations. The online survey of self-reported retrospective data may have been prone to recall bias. Data collection occurred during the COVID-19 pandemic when depression and anxiety symptoms may have been higher among participants, potentially influencing perceptions of their recent pregnancy. Additionally, the length of the survey may have resulted in quality issues, and the sample provided by Qualtrics may not be truly representative of women in the South, as it excluded those without reliable internet access. Lastly, beyond the scope of this study was a consideration of how the trends identified by race are likely connected to a range of racism-related exposures in everyday life and health care spaces (Ford & Airhihenbuwa, 2010). The results echo patterns found in the existing literature on prenatal PA and provider counseling.

Conclusion and Implications for Practice

The findings of this study revealed that patients across sociodemographic factors face similar barriers to PA during pregnancy and lack knowledge of the specific benefits of PA and their susceptibility to chronic disease. Moreover, provider counseling was ineffective at increasing PA during pregnancy. Adopting established methods of behavior change communication, such as motivational interviewing (also called motivational counseling; Syed et al., 2021) could offer efficient techniques that improve provider counseling while preserving providers' energy and well-being (Endrejat, 2021), resulting in better health outcomes and patient-provider experiences (Haverfield et al.,

2020). Additionally, provider counseling should be performed with an understanding of the various societal factors that influence prenatal PA (Jette et al., 2017). For instance, Jette and colleagues' embodied conceptual framework facilitates an evaluation of how social and structural (dis)advantages accumulate during the life course and across generations and are expressed in health-related behaviors and outcomes. This framework could work with motivational interviewing to promote competent care (Avruch & Shaia, 2022) and inform larger-scale prenatal exercise interventions. Given the paucity of PA in the South and high levels of obesity-related chronic disease among expecting patients, improved provider counseling is essential to prenatal health.

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