

Do Antenatal Religious and Spiritual Factors Impact the Risk of Postpartum Depressive Symptoms?

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ABSTRACT

Objectives: Previous research has identified an inverse relationship between religiosity/spirituality and depressive symptoms. However, prospective studies are needed. This study investigates the association between antenatal religiosity/spirituality and postpartum depression, controlling for antenatal depressive symptoms, social support, and other potential confounders.

Methods: This is a prospective cohort study. Women receiving prenatal care were enrolled from three obstetrics practices. Follow-up assessment was conducted at the 6-week postpartum clinic visit. Four measures of religiosity and two measures of spirituality were assessed at baseline. A measure of overall religiosity/spirituality was also created using principal component factor analysis. Depressive symptoms were measured at baseline and again at follow-up using the Edinburgh Postnatal Depression Scale (EPDS). A cutoff score of ≥ 13 was used to identify women with significant depressive symptoms.

Results: Four hundred four women were enrolled, and 374 completed follow-up. Thirty women experienced pregnancy loss, leaving 344 with postpartum assessment; 307 women had complete data and were used for analyses. Thirty-six women (11.7%) scored above the EPDS screening cutoff. Controlling for significant covariates (baseline EPDS score and social support), women who participated in organized religious activities at least a few times a month were markedly less likely (OR = 0.18, 95% CI) to exhibit high depressive symptom scores. No other religiosity/spirituality measure was statistically significant.

Conclusions: Organized religious participation appears to be protective from postpartum depressive symptoms. Because this association is independent of antenatal depressive symptoms, we hypothesize that religious participation assists in coping with the stress of early motherhood.

INTRODUCTION

POSTPARTUM DEPRESSION may be the most common complication of childbirth. A recent meta-analysis¹ reported that the maximum point

prevalence of major or minor postpartum depression was 12.9% 3 months postpartum, with a period prevalence of 19.2% in the first 3 months after delivery. The maximum point prevalence for major depression was 5.7% 2 months post-

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partum, with a period prevalence of 7.1% in the first 3 months after delivery.

Postpartum depression can cause significant morbidity for affected women, and there may be long-term repercussions. One study found that women with postpartum depression were more than four times as likely to screen positive for depression 4 years later than controls who were not depressed postpartum.² Postpartum depression may also have negative effects on the offspring of affected women, affecting maternal-child interactions and bonding.^{3,4} There is also evidence that postpartum depression is associated with small reductions in intelligence of children, particularly sons, but this association may be related to chronic maternal depression (not purely postpartum).^{3,5} Children of mothers who experienced postpartum depression are more likely to exhibit behavior problems, as reported by mothers² and teachers.⁶

A meta-analysis of antenatal predictors of postpartum depression identified depression or anxiety during pregnancy, past history of psychiatric illness, lack of social support, and stressful life events as the most important risk factors.⁷ Although religiosity and spirituality have been found to have an inverse association with depressive symptoms in numerous study populations,^{8,9} there has been little research on the association of these attributes with postpartum depression. A prospective study of unmarried adolescent mothers found that religious involvement was associated with increased depressive symptoms.¹⁰ A prospective study in Thai women found that non-Buddhist women were at increased risk of postpartum depression compared with Buddhists,¹¹ and a cross-sectional study demonstrated that secular Israeli women were more likely to screen positive for postpartum depression than those who adhered to the Jewish faith.¹² In another cross-sectional study, self-rated importance of spiritual beliefs was inversely associated with postpartum depressive symptoms in Mexican American women in California.¹³ Finally, a prospective study of Maltese women¹⁴ found a rate of new onset postpartum depression substantially lower than that experienced in other locales; the authors speculated that the low rate "may be attributable to the social support available to women living in a cohesive Catholic island community."

Religiosity appears to more strongly influence depressive symptoms in populations that are

highly stressed.^{8,9} Given that childbearing and motherhood can cause physical, psychological, and social stress, we anticipated that religiosity and spirituality may help protect women from symptoms of postpartum depression.

MATERIALS AND METHODS

This is a prospective cohort study conducted to evaluate the association of antenatal religiosity and spirituality with depressive symptoms in postpartum women, primarily within the first 2 months after delivery. The protocol received institutional review board approval. Two obstetrics practices in Columbia, South Carolina, and one obstetrics practice in Jackson, Mississippi, were chosen as study sites. The two sites in South Carolina were (1) a private practice affiliated with a medical school and staffed by obstetrics faculty and (2) an obstetrics clinic affiliated with the same medical school and staffed by obstetrics residents. The Mississippi site is a large, urban/suburban private practice.

Women seeking prenatal care in late 2005/early 2006 were recruited by nursing staff or a research assistant. An attempt was made to enroll women at their first prenatal appointment. Women missed at their first appointment were approached about the study when they returned for follow-up, as were women already receiving prenatal care at the beginning of the study. All pregnant women who were at least 18 years old and able to speak and comprehend English effectively were asked to participate.

Baseline assessment was conducted at the time of enrollment. Follow-up assessment of depressive symptoms was conducted when participants returned for routine clinical postpartum follow-up approximately 6 weeks after delivery. Women completed the written study instruments independently unless they requested assistance, in which case help was provided. Participants who did not keep the follow-up appointment or did not complete the follow-up questionnaire at that appointment were called and asked to complete it by telephone.

Measures

Key variables measured at baseline were religiosity/spirituality, social support, and symptoms of anxiety and depression. Six constructs of

religiosity/spirituality were assessed: organizational religious activities, nonorganizational religious activities, intrinsic religiosity, daily spiritual experiences, self-rated spirituality, and self-rated religiosity. Organizational religiosity, nonorganizational religiosity, and intrinsic religiosity were assessed using the Duke Religion Instrument.^{15,16} The other measures were from the Brief Multidimensional Measure of Religiousness/Spirituality developed by the National Institute on Aging and the Fetzer Institute.¹⁷ The Duke Religion Instrument and the Brief Multidimensional Measure of Religiousness/Spirituality have been widely used to study religiosity/spirituality and physical and mental health outcomes, although we are not aware of previous use in pregnant and postpartum women

Self-rated spirituality and religiosity were measured using two questions with 4-point scales ranging from "very spiritual" (or "very religious") to "not spiritual at all" (or "not religious at all"). The organizational and nonorganizational religious activity questions assess how often participants (1) attend religious meetings and (2) participate in private religious activities; answers range from "more than once a day" to "rarely or never." Intrinsic religiosity is measured using three questions about the role of religion in the participant's life, with 5-point Likert scales ranging from "definitely true of me" to "definitely not true." The Daily Spiritual Experiences Scale comprises six questions that assess how frequently spiritual experiences occur, ranging from "many times a day" to "never or almost never."

We anticipated that some or all of the religiosity/spirituality items might be related to a smaller number of underlying factors, perhaps one for religiosity and one for spirituality. Principal component factor analysis was performed to evaluate whether the different religious/spiritual constructs could be combined into one or more measure(s) of religiosity/spirituality. All the measures loaded on one underlying factor, which we call overall religiosity/spirituality. The individual religiosity/spirituality measures were highly correlated with overall religiosity/spirituality (Pearson correlation coefficients ranged from 0.70 for nonorganizational religious activity to 0.84 for intrinsic religiosity). Overall religiosity/spirituality was scaled to have a mean of 0 and a standard deviation (SD) of 1.0.

Social support was measured with the Duke-UNC Functional Social Support Questionnaire.¹⁸

The University of North Carolina Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) version of the scale was used (available at www.iprc.unc.edu/longscan/pages/measures/Baseline/m16.pdf). This version consists of seven items from the original scale that were found to be reliable and valid, plus three additional items developed by the LONGSCAN study group for assessing instrumental social support. The social support score is calculated by summing the total of all responses.

Symptoms of anxiety were measured using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS).¹⁹ The anxiety subscale consists of seven questions scored from 0 to 3, with a maximum score of 21. As of 2002, the HADS had been used in over 700 studies globally.²⁰

Measuring depressive symptoms

Depressive symptoms were measured at baseline and follow-up using the Edinburgh Postnatal Depression Scale (EPDS), which is widely used to screen for postpartum depressive symptoms.^{21,22} The scale comprises 10 questions inquiring about depressive symptoms in the previous 7 days. Possible scores range from 0 to 30. A cutoff of ≥ 13 is recommended to screen for major depression in postpartum women.^{23,24} A cutoff score of ≥ 15 is used to screen for major depression during pregnancy.^{23,25} The sensitivity of the EPDS to detect major postpartum depression at the recommended cutoff score of ≥ 13 greater ranges from 75% to 100%; specificity has ranged from 84% to 99%.²⁶

Demographics and other covariates

In addition to these standardized measures, women were asked for information on age, race, marital/relationship status, quality of relationship with the baby's father, education level (as a proxy for socioeconomic status), number of weeks pregnant, estimated due date, number of children, previous pregnancy loss, whether the pregnancy was intended, and whether they had difficulty becoming pregnant. They were also asked about history of mental illness, current (at the time of enrollment) treatment of mental illness, and family history of mental illness. At follow-up, they were asked about the pregnancy outcome (live birth or pregnancy loss) and the date of delivery or pregnancy loss in addition to

depressive symptoms. Women who reported pregnancy loss were excluded from this analysis.

Because the literature shows that stressful life events are associated with an increased risk of postpartum depression,⁷ we also included questions at follow-up about life stressors that had occurred in the previous 12 months and about complications of the pregnancy. The life stress variables assessed were a significant move, a death in the family, serious illness of the participant, serious illness of a loved one, severe money problems, and a relationship breakup or severe relationship problems. The pregnancy complications assessed were preeclampsia or toxemia, preterm labor, uncontrolled vomiting, emergency cesarean section, and serious health problems in the baby.

Analyses

We modeled the odds of a follow-up EPDS score above the recommended screening cutoff (≥ 13) using logistic regression, in a three-step process. First, we modeled the odds of a positive screen for postpartum depression as a function of each religiosity/spirituality variable without controlling for any covariates. Second, we identified significant covariates. The odds of a positive depression screen were modeled in univariable logistic regression, with each of the nonreligious/spiritual variables. All the covariates described in the Measures section were included in the univariable regression models, except for the stress and pregnancy complication items that were assessed at follow-up (because they were not measured prospectively and were, therefore, more subject to reporting bias). Gestational age (estimated from the reported due date at baseline and the delivery date) and the number of days between delivery and follow-up assessment were also assessed. Variables that were significant in the univariable models were placed in a multivariable model. Nonsignificant variables were removed until only those that were statistically significant ($p < 0.05$) remained. Next, we added the religiosity/spirituality variables that were significant in the bivariable regression modeling to the model that included all the independently significant covariates. The model was run separately for each religiosity/spirituality variable rather than placing all the religiosity/spirituality variables in the same model.

This three-stage approach allowed us to evaluate the importance of each religiosity/spiritual-

ity measure, controlling for significant covariates, without causing problems with multicollinearity. Multicollinearity can occur when multiple highly correlated variables (which was the case with the religiosity/spirituality measures in our sample) are included together in a regression model, resulting in unreliable regression output.

After completing this primary modeling process, we conducted additional subgroup analyses to test the robustness of the primary modeling results. We also tested the effect of adding the stress and pregnancy complication measures to the final regression model.

RESULTS

Recruitment was very successful in the large private practice and faculty clinic. In the private practice, 312 women agreed to participate of 361 who were approached, an enrollment rate of 86%. In the faculty practice, 73 of 80 women enrolled (91%). Only 57 women were approached at the residents' clinic because of a number of logistical issues, including space limitations, high rates of missed appointments, and other scheduling problems. Nineteen (33%) of these 57 women enrolled.

In all, 404 women enrolled in the study, and 374 (92.6%) completed postpregnancy follow-up. Thirty of these women reported pregnancy loss, leaving 344 women available for analysis of postpartum depressive symptoms. Twenty-six women were missing a single answer on the 10-item social support scale. For these women, the mean on the remaining 9 social support questions was substituted for the missing variable. Ten women were missing the number of weeks pregnant at enrollment. For these women, the number of weeks was estimated using the reported due date. Thirty-seven women were missing at least one other data point that could not be easily substituted and were, therefore, excluded from the multivariable modeling. Thus, the final sample size for analyses was 307.

Descriptive information for the 307 women with complete baseline and postpartum data is presented in Table 1. On average, women were 10 weeks pregnant at enrollment; 285 (93%) were < 20 weeks. Black and white women were well represented. Almost 80% of participants were married, and two thirds reported having at least a college degree. These characteristics were re-

TABLE 1. CHARACTERISTICS OF PARTICIPANTS

Variable		Number (%)	Mean (SD)
Age			28.5 (5.5)
No. of days from delivery to follow-up			50.5 (21.2)
Social support			43.4 (5.8)
Delivery data minus due date			-12.5 (22.0)
Mean baseline EPDS score			8.1 (4.6)
Site	SC residents'	7 (2.3)	
	SC faculty	56 (18.2)	
	MS community	244 (79.5)	
Race	White	191 (62.2)	
	Black	104 (33.9)	
	Other	12 (3.9)	
Marital status	Married	240 (78.2)	
	Unmarried	67 (21.0)	
College degree	Yes	202 (65.8)	
	No	105 (34.2)	
Desire for pregnancy	Trying	156 (50.8)	
	Other	151 (49.2)	
Difficulty becoming pregnant	Yes	46 (15.0)	
History of mental illness	Yes	68 (22.2)	
Religious attendance	More than once a week	70 (22.8)	
	Once a week	96 (31.3)	
	A few times a month	78 (25.4)	
	Rarely or never	63 (20.5)	
Mean follow-up EPDS score			6.4 (5.0)
Positive postpartum depression screen	EPDS \geq 13	36 (11.7)	

flective of the patients served by the two practices that comprised the majority of the sample. Just over half the participants reported trying to become pregnant, and 15% reported difficulty becoming pregnant. The mean baseline EPDS score was 8.1 of a possible 30. Twenty-nine women (9.4%) screened positive for antenatal depressive symptoms (EPDS \geq 15). Two hundred seventy-one women (88.3%) described their religion as "Christian." Three were Muslim, 1 was Hindu, and 7 stated they had no religion. Twenty-five women reported "other" religious affiliations, many of which would generally be considered as at least related to Christianity (Jehovah's Witness, for example).

On average, follow-up assessment occurred 51 days after delivery. Two hundred sixty-eight (87.3%) participants were between 4 and 12 weeks postpartum at follow-up. Seventeen women (5.5%) were less than 28 days postpartum at follow-up, and 22 (7.2%) women were more than 12 weeks. Thirty-six women (11.7%) scored above the screening cutoff for postpartum depression (EPDS \geq 13). Twelve of these women had scored

above the screening cutoff for antenatal depression.

Four religiosity/spirituality measures significantly predicted a positive screen for postpartum depression in bivariable logistic regression: overall religiosity/spirituality (OR = 0.64, 95% CI 0.47, 0.88, $p = 0.006$), self-rated spirituality (OR = 0.57, 95% CI 0.37, 0.89, $p = 0.01$), self-rated religiosity (OR = 0.60, 95% CI 0.38, 0.92, $p = 0.02$), and organizational religious participation (OR = 0.55, 95% CI 0.39, 0.79, $p = 0.001$). Four nonreligious/spiritual variables significantly predicted a positive screen for postpartum depression in bivariable logistic regression: baseline depression score, anxiety score, history of mental illness, and social support. These four variables were included in a multivariable regression model. Only baseline depression score and social support remained significant. Baseline depression score was associated with increased odds of a positive screen (OR = 1.17, 95% CI 1.07, 1.23, $p = 0.0003$), whereas social support was protective (OR = 0.91, 95% CI 0.85, 0.97, $p = 0.0049$) (Table 2).

TABLE 2. MULTIVARIABLE LOGISTIC REGRESSION MODEL: NONRELIGIOUS, NONSPIRITUAL PREDICTORS OF POSITIVE DEPRESSION SCREEN (EPDS \geq 13)

	OR	95% CI	p
Depression score	1.17	1.07, 1.23	0.0003
Social support score	0.91	0.85, 0.97	0.0049

The four individually significant religiosity/spirituality variables were examined one at a time by adding each one separately to a model with depression score and social support as covariates (Table 3). Overall religiosity/spirituality was inversely associated with the odds of a positive screen but did not reach statistical significance (OR = 0.74, 95% CI 0.51, 1.07, $p = 0.11$). Self-rated religiosity (OR = 0.62, 95% CI 0.38, 1.04, $p = 0.07$) and self-rated spirituality (OR = 0.66, 95% CI 0.46, 1.08, $p = 0.098$) were marginally significant. Participation in organized religious activities remained highly significantly protective (OR = 0.59, 95% CI 0.40, 0.86, $p = 0.006$). Baseline depression score and social support were statistically significant in every model.

Organized religious participation was treated as a continuous variable in the primary logistic regression modeling, assuming the odds of a positive screen for postpartum depression change equally with movement from each point in the Likert scale to the next. We wanted to investigate whether there was a threshold level of religious participation above which additional involvement would have less impact on depressive symptoms. To do so, we looked at unadjusted frequency counts of postpartum depression screening results by level of participation in organized religious activities. Nineteen of 63 (30.2%) women who rarely or never participated in organized religious activities screened positive for postpar-

tum depression vs. 8.6% of those who participated two or more times per week, 7.3% of those who participated once a week, and 5.1% of those who participated a few times a month.

As it appeared that any level of organized religious participation was protective, we reran the model predicting a postpartum EPDS score of \geq 13, including baseline depression score and social support, and a dichotomized variable for organized religious participation (coded as 0 if the woman rarely/never participated vs. 1 for any other response). In this model, organizational religious participation was very strongly protective (OR = 0.18, 95% CI 0.08, 0.42, $p < 0.0001$) (Table 4). In fact, the dichotomized measure was more highly significant than either baseline depression score (OR = 1.16, $p = 0.002$) or social support (OR = 0.91, $p = 0.006$).

Next, we tested the effect of changing the cutoff point for a positive screen on the EPDS, using a lower cutoff of \geq 11 or higher and a high cutoff point of \geq 15. Fifty-seven women (18.6%) scored above the low cutoff, and 26 (8.5%) scored above the high cutoff. Using the lower cutoff score, the original organized religious participation variable was no longer significant when controlling for depression score and social support (OR = 0.82, 95% CI 0.62, 1.10, $p = 0.19$), but the dichotomized religious participation variable was strongly protective (OR = 0.28, 95% CI 0.14, 0.56, $p = 0.0003$). Using the higher cutoff score resulted in almost identical findings: the original organized participation variable was not significant (OR = 0.76, 95% CI 0.51, 1.14, $p = 0.19$), but having at least occasional organized participation was strongly protective (OR = 0.31, 95% CI 0.12, 0.76, $p = 0.011$). None of the other religiosity/spirituality variables approached significance with the lower and higher cutoff scores when control-

TABLE 3. RELIGIOUS/SPIRITUAL CHARACTERISTICS AND ODDS OF POSITIVE DEPRESSION SCREEN^a

	OR	95% CI	p
Overall religiosity/spirituality	0.74	0.51, 1.07	0.113
Organized religious participation	0.59	0.40, 0.86	0.006
Private religious participation	0.91	0.73, 1.14	0.420
Self-rated spirituality	0.66	0.40, 1.08	0.098
Self-rated religiosity	0.62	0.38, 1.04	0.068
Daily spiritual experiences	0.99	0.93, 1.06	0.778
Intrinsic religiosity	0.99	0.86, 1.15	0.932

^aA separate model was run for each of the six measures of religiosity/spirituality. Baseline depression score and social support were included in each model.

TABLE 4. ANY ORGANIZED RELIGIOUS PARTICIPATION AND ODDS OF POSITIVE DEPRESSION SCREEN, DIFFERENT CUTOFF SCORES^a

Cutoff score	OR	95% CI	p
EPDS > 10	0.28	0.14, 0.56	0.0003
EPDS > 12	0.18	0.08, 0.42	<0.0001
EPDS > 14	0.31	0.12, 0.76	0.011

^aFor each cutoff score, the impact of at least occasional religious participation was modeled, controlling for baseline depression score and social support.

ling for antenatal depression score and social support.

As noted previously, there was some variability in the timing of enrollment and follow-up. We reestimated the logistic regression model, limiting the sample to women who were <20 weeks pregnant at enrollment and were at least 28 days but no more than 12 weeks postpartum at follow-up. Two hundred fifty-three women met these criteria. Social support and baseline depression score were once again statistically significant. The effect of at least occasional religious attendance did not change substantially (adjusted OR = 0.26, 95% CI 0.10, 0.64, $p = 0.004$).

Aware that our sample was not fully representative of all pregnant women in the Southern United States (the majority were married and college educated), we conducted several subanalyses of the association between at least occasional religious participation and a positive screen for postpartum depression. Because some of the cell sizes were small, we did not control for social support and baseline depression score in these models. The results are shown in Table 5. Among the 67 women who were not married, at least occasional participation in organized religious activities was strongly protective (OR = 0.11, 95% CI 0.02, 0.64, $p = 0.01$). In the 105 women without a college degree, the OR was 0.25 (95% CI 0.08, 0.84, $p = 0.02$). The OR was <1.0, indicating a protective effect, for every major subgroup analyzed, even though in a few cases it was not statistically significant (likely because of small cell sizes).

As stated previously, we did not include the stress and pregnancy complication variables assessed at follow-up in the primary analyses, as they were not assessed prospectively and are, therefore, more subject to bias (women who were depressed could have answered the questions differently because of their depression). How-

TABLE 5. ANY ORGANIZED RELIGIOUS PARTICIPATION AND ODDS OF POSITIVE DEPRESSION SCREEN, BY SUBGROUP

Characteristic	n	Number with positive postpartum screen	OR	95% CI
<15 weeks pregnant at enrollment; postpartum follow-up ≥ 28 days and ≤ 84 days	253	26	0.26 ^{a,b}	0.10, 0.64
<15 weeks pregnant at enrollment	267	32	0.19	0.09, 0.40
≥ 15 weeks pregnant at enrollment	40	4	0.09	0.01, 0.90
Postpartum follow-up ≤ 84 days	285	31	0.19	0.09, 0.40
Postpartum follow-up >84 days	22	5	0.09	0.01, 0.90
White race	191	23	0.19	0.08, 0.48
African American or other race	116	13	0.08	0.02, 0.34
Age <29	158	20	0.13	0.05, 0.35
Age ≥ 29	149	16	0.26	0.09, 0.76
Unmarried	67	7	0.11	0.02, 0.64
Married	240	29	0.18	0.08, 0.42
< College degree	105	13	0.25	0.08, 0.84
College degree	202	23	0.14	0.05, 0.34
History of mental illness	68	14	0.51	0.15, 1.73
No history of mental illness	239	22	0.11	0.04, 0.27
Baseline EPDS ≥ 15	29	12	0.19	0.03, 1.21
Baseline EPDS <15	278	24	0.14	0.06, 0.34
Social support score <45	148	30	0.16	0.07, 0.37
Social support score ≥ 45	159	6	0.37	0.07, 2.15

^aThe first odds ratio is adjusted for social support and baseline depression score; the other odds ratios are unadjusted.

^bStatistically significant ($p < 0.05$) odds ratios are in **bold**.

ever, we did want to examine if these variables were independently associated with odds of a positive screen for postpartum depression and if including them in the model altered the relationship between organizational religious participation and postpartum depressive symptoms. We added the 11 stress/pregnancy complication variables to the logistic regression model with baseline depression score, social support, and the dichotomous variable for participation in organized religious activities. Social support (OR = 0.90, $p = 0.01$), baseline depression score (OR = 1.13, $p = 0.02$), and at least occasional participation in organized religious activities (OR = 0.13, $p < 0.0001$) remained statistically significant after all the stress and pregnancy complication variables were added. Then, we eliminated non-significant variables one at a time, starting with the least significant variable. Two life stress variables and one pregnancy-related variable narrowly missed statistical significance and were retained in the final model. They were a significant move (OR = 0.12, $p = 0.058$), a breakup or relationship problems (OR = 4.10, $p = 0.053$), and serious health problems in the baby (OR = 6.55, $p = 0.055$). The ORs for social support (OR = 0.91, $p = 0.01$), baseline depression score (OR = 1.15, $p = 0.003$), and religious participation (OR = 0.15, $p < 0.0001$) were again highly significant in the final model.

Finally, we wanted to determine if the effect of religious participation was consistent across the different items of the EPDS. To do so, we calculated the Spearman correlation coefficient between participating in organized religious activities at least a few times a month and each of the 10 items in the EPDS. The correlation coefficients ranged from -0.096 to -0.193 . There was a statistically significant inverse correlation with every item in the scale except for the second ("I have looked forward with enjoyment to things") and seventh ("I have been so unhappy that I have had difficulty sleeping"). The correlations with these two items narrowly missed statistical significance. We were especially interested in the association of at least occasional participation in organized religious activity and other religiosity/spirituality measures with the final item in the EPDS: "The thought of harming myself has occurred to me," as this is particularly important clinically, and the response might be impacted by religious beliefs about suicide. At least occasional organized religious participation was signifi-

cantly inversely correlated ($r = -0.12$, $p = 0.03$). A significant inverse correlation also existed for self-rated religiosity ($r = -0.126$, $p = 0.03$), but none of the other measures of religiosity or spirituality was significant.

DISCUSSION

We believe this is the most thorough study of religiosity/spirituality and postpartum depression to date. The validity of the findings is bolstered by the significant effects of baseline depression score and social support, which are consistent with previous research.⁷ The results are also generally consistent with those reported by Limlomwongse and Liabsuetrakul in Thai women¹¹ and by Dankner et al. in Israeli women¹²; in both of these studies affiliation with the dominant religion (Buddhism and Judaism) appeared to be protective from postpartum depression. The association of religious involvement with increased risk of postpartum depression in adolescent mothers reported by Sorenson et al.¹⁰ may be an aberration, perhaps related to religious prohibitions of adolescent/unmarried sexual activity. If that is the case, it is interesting that the OR was similar for married and unmarried women in our sample (all of whom were at least 18 years old).

Although we did not find overall religiosity/spirituality to be statistically significantly protective after adjusting for social support and baseline depressive symptoms, participating in organized religious activities at least a few times per month was a statistically significant and very strong protective factor. For women who participated in organized religious activities at least occasionally, however, increased religious involvement did not appear to confer additional risk reduction for depressive symptoms.

Most studies of religiosity and depression have been conducted cross-sectionally, which results in a classic "chicken or egg" debate about whether religiosity reduces depressive symptoms or depressed people are less likely to (1) participate in or (2) report religiosity or religious activities. One might conjecture that the inverse association between religious participation and postpartum depressive symptoms in this study is present because women who are depressed are less inclined to participate in religious or other social activities. However, that is not a likely ex-

planation, as the study was conducted prospectively, and organizational religious participation remained highly significant after controlling for baseline depressive symptoms.

Moreira-Almeida et al.⁹ propose that religion may influence mental health through seven mechanisms: (1) promoting healthy behaviors and lifestyle, (2) social support, (3) providing a belief system/cognitive framework that enhances adaptive coping, (4) direct psychological effects of religious practices (such as meditation), (5) providing a sense of spiritual direction and meaning in life, (6) providing an idiom to express stress, and (7) a multifactorial explanation that is a combination of these six mechanisms. Other authors have emphasized the role of increased social support.²⁷

Because participation in organized religious activities (by definition a social activity) was the only statistically significant religious/spiritual variable, it seems reasonable to postulate that the effect was at least partly socially mediated. Although the association was independent of baseline social support score, it is important to note that organized religious participation and social support were measured only at baseline. It is possible that women who had contact with a religious community on a regular basis experienced greater social support after delivery than women who were not involved in a faith community, independent of antenatal social support. Social support would need to be measured both antenatally and postpartum to assess this possibility. Other researchers have reported that the size of a woman's social network is independently protective from postpartum depression, even when social support is taken into account.²⁸ It may be that the effects of organizational religious participation are no different from what would be experienced by participating in other kinds of formal group activities (e.g., sports leagues, community service organizations). On the other hand, there may be aspects of participation in a faith community (such as a shared belief system and a focus on ministry to members) that would not be present in other types of social groups.

A significant limitation of this study is that the majority of participants came from a single obstetrics practice in the American South, participants reported being well educated on average, and only 20% were unmarried. Thus, findings may not be entirely generalizable to other geo-

graphic regions and even to some populations in the South. On the other hand, subgroup analyses revealed that participation in organized religious activities was protective in every major subgroup, including unmarried women, women without a college degree, and those with a history of mental illness (although for some subsets, the association was not statistically significant because of small cell size).

A second limitation is that almost the entire sample reported some religious faith, and the large majority were Christian. These attributes are reflective of the American South, where 90% of people identify themselves as Christian, only 5.5% state they have no religion, and 65% of women report attending religious services at least two to three times per month.²⁹ The findings may not be generalizable to less religious populations or women of other religions.

A final limitation is the reliance on a screening instrument for postpartum depression rather than a diagnostic interview. The EPDS cannot provide a definitive diagnosis of depression, so misclassification of cases and noncases is possible. On the other hand, the EPDS is a validated and widely accepted screening tool with good sensitivity and specificity. It is unlikely that misclassification bias could have accounted for the very strong effect of organizational religious participation.

The study has a number of strengths to commend it. Most importantly, it was conducted prospectively, unlike the large majority of studies of religiosity/spirituality and depression.^{8,9} Prospective data collection makes it possible to infer that a causal relationship may be present. Second, the study enrolled a substantial number of women, and follow-up information was collected from >90% of them. Third, a broad range of religiosity/spirituality measures was used, allowing comparison of the relative effects of the different constructs. Assessment of covariates was also thorough, including the most important risk/protective factors identified in previous studies.

CONCLUSIONS

Previous research has demonstrated an inverse association between religiosity and depression that tends to be greater in stressed populations, implying that religiosity may foster more effec-

tive coping with stress. In our sample of postpartum women, organized religious participation was significantly protective from depressive symptoms even after controlling for antenatal depression score, indicating that the inverse association between religious participation and postpartum depression goes beyond any relationship between religious attendance and antenatal depressive symptoms. This would seem to support the hypothesis that religious attendance has a stress buffering effect that specifically assists women in handling the challenges of early motherhood.

Our study measured organized religious participation using a single question and only assessed postpartum depression at a single point in time, on average 51 days postpartum. In addition to enrolling patients from different geographic regions and with a broader range of demographic and religious characteristics, future research should include longitudinal assessment of depressive symptoms to determine if the effect of organized religious participation extends into the later postpartum period. It should also address different types of organizational religious participation (such as worship service attendance, participation in prayer groups, and religious social activities) and nonreligious social participation (such as sports leagues, professional organizations, and service clubs). Finally, comparison of postpartum support received by new mothers who participate in organized religious activities vs. those who do not participate would illuminate the role of the faith community as a source of postpartum social support. Continuing this line of research is important because better knowledge of religious and other psychosocial protective factors may lead to the development of effective interventions for preventing postpartum depression.

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