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Original contribution

Religiosity, spirituality and antenatal anxiety in Southern U.S. women

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Summary

Introduction: We investigated the association between religiosity, spirituality, and anxiety in pregnant women, taking into account potential confounders.

Materials and methods: From September 2005 through March 2006, pregnant women in three obstetrics practices in the American South were included in a cross-sectional study. The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety.

Results: Of the 344 participating women, 23 screened positive for moderate to severe anxiety (HADS [anxiety] score greater than 10). Overall religiosity or spirituality (odds ratio [OR], 0.53; $p = 0.006$) and social support (OR, 0.42; $p < 0.0001$) were significantly associated with significantly lower odds of a positive anxiety screen. Among the specific measures of religiosity or spirituality, self-rated religiosity, self-rated spirituality, and participation in nonorganizational religious activities were significantly associated with lower odds of moderate to severe anxiety symptoms.

Discussion and conclusions: Religiosity and spirituality are associated with reduced anxiety in pregnant women. Additional study is needed to evaluate whether the association is causal.

Keywords: Spirituality; religion; anxiety; pregnancy; women

Introduction

Antenatal anxiety

Antenatal anxiety is an established risk factor for postpartum depression (Robertson et al. 2004; Sutter-Dallay et al. 2004). Associations between antenatal anxiety and pregnancy outcomes have also been identified but are controversial. A recent meta-analysis reported that there was not a significant association between anxiety symptoms and overall perinatal outcomes, though small statistically significant relationships were present for birth weight and 5-minute Apgar score (Littleton et al. 2007). There is stronger evidence of an association between antenatal anxiety and child neurodevelopment. For example, one study (Van den Bergh and Marcoen 2004) found that maternal antenatal anxiety explained 22% of the variance in ADHD (attention deficit hyperactivity disorder) symptoms and 9% of anxious symptoms in 8- to 9-year-old children, after controlling for postpartum maternal anxiety. Another study demonstrated significant anxiety in late pregnancy was associated with a doubling of the risk of child ADHD, anxiety or depression, or conduct disorder at 4 and 7 years of age (O'Connor et al. 2002). The evidence regarding antenatal anxiety and neurobehavioral outcomes in infants, children, and adults is thoroughly described in a recent review article (Talge et al. 2007).

Prevalence rates of generalized anxiety in pregnant women have been quite consistent in samples from different Western nations. A Norwegian study using the Hospital Anxiety and Depression Scale (HADS) reported that significant symptoms of generalized anxiety (HADS-A score, >7) were present in 10.4% of preg-

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nant women (Berle et al. 2005). Prevalence was approximately 12% in first- and third-trimester women and 7.5% in the second trimester. Another study, in French women, used diagnostic interviews to identify anxiety disorders; generalized anxiety disorder was detected in 8.5% of study participants (Sutter-Dallay et al. 2004). Finally, 8% of pregnant women screened at an ethnically diverse inner-city obstetric population in the United States screened positive for generalized anxiety on the PRIME-MD (Primary Care Evaluation of Mental Disorders) (in addition to 2% who screened positive for panic disorder) (Kim et al. 2006).

Population-based studies have generally reported point prevalence of DSM-III-R defined generalized anxiety disorder between 1.5 and 3.0%, with a higher prevalence in women than men (Kessler et al. 2001). While these rates are below those noted in studies of pregnant women, we are not aware of research directly comparing rates of generalized anxiety disorder in pregnant versus nonpregnant women. A prospective study in British women reported that the prevalence of common mental health disorders did not differ significantly for pregnant or postpartum women versus nonpregnant women (van Bussel et al. 2006). However, that study screened for mental health problems by the GHQ-12 (General Health Questionnaire), which does not provide a precise psychiatric diagnosis. Therefore, the literature is not conclusive about whether generalized anxiety disorder is in fact more common during pregnancy than at other times.

In their meta-analysis, Littleton et al. (2007) report a number of significant correlates of antenatal anxious symptoms. Significant inverse associations include increasing age, educational level, socioeconomic status, and social support. Significant positive correlates include gestational age at assessment, gravida or parity, negative life events, and perceived stress. There is a strong correlation between antenatal anxiety and depressive symptoms ($r = 0.66$, $p < 0.001$).

Religiosity, spirituality, and mental health

There has been increasing interest in the relationship between religiosity or spirituality and mental health in the past two decades. Moreira-Almeida et al. (2006) propose that religion may influence mental health through six mechanisms: (1) promoting healthy behaviors and lifestyle; (2) social support; (3) providing a belief system or cognitive framework that enhances adaptive coping; (3) direct psychological effects of religious practices (such as meditation); (4) providing a sense of spiritual direction and meaning in life; (5) providing an idiom to express stress; and (6) a multifactorial explanation that is a combination of these five mechanisms. Others have emphasized the potential for religious participation to improve mental health by providing an avenue for increased social support (Eckersley 2007).

Numerous epidemiologic studies have demonstrated religiosity to be inversely associated with symptoms of mental illness, most notably depression (Smith et al. 2003). A recent longitudinal study revealed that religious attendance in 1997 was significantly associated with better mental health (measured by the SF-12) at follow-up in 2003 (King et al. 2005). Another recent study reported that worship attendance was significantly inversely associated with the odds of current mental illness (including panic disorder and social phobia, though generalized anxiety was not assessed) and substance abuse in Canadian adults, while endorsement of spiritual values was not protective for most conditions (Baetz et al. 2006). In fact, endorsement of spiritual values was significantly associated with increased odds of current depression, mania, and social phobia.

The relationship between religiosity or spirituality and generalized anxiety is not well understood. A review of the literature on religiosity and anxiety (Shreve-Neiger and Edelstein 2004) found that religious attendance and intrinsic religious orientation (viewing religion as the framework in which all of life is understood) were generally associated with lower levels of anxiety. However, there were also studies indicating that religiosity was not associated with reduced anxiety and even a few studies which found that certain aspects of religiosity (most notably extrinsic religiosity, which views religious activities as means to an end rather than being worthwhile for their own sake) were associated with increased anxiety. A number of weaknesses were consistently noted, including small and/or nonsystematic samples, inadequate measurement of religiosity, and suboptimal statistical analyses. Therefore, more study was recommended.

Several studies have reported an inverse association between spiritual well-being and anxiety in cancer patients (Kaczorowski 1989; Boscaglia et al. 2005; McCoubrie and Davies 2006), but care must be taken in drawing conclusions from these studies, since the spirituality measure used (the Spiritual Well-Being Scale) includes items such as ''I feel that life is a positive experience'' and ''I feel a sense of well-being about the direction my life is headed in'' (Hill and Hood 1999). As measured by this scale, ''spiritual well-being'' may

be as much a measure of mental health as an independent protective factor.

We identified only one article that addressed the association of religiosity or spirituality with anxiety in pregnant women. It was a validation study of the Spiritual Perspective Scale in pregnant African American women (Dailey and Stewart 2007). As a means of documenting scale validity the authors reported that the scale was significantly inversely correlated with symptoms of anxiety ($r = -0.23$, $p < 0.05$), but they did not conduct multivariable analyses of the association. They neither reported whether religious attendance or other measures of religiosity were related to levels of anxiety. Given the substantial prevalence of generalized anxiety in pregnant women, the possibility that anxious symptoms may negatively impact pregnancy and child outcomes, and the evidence that religiosity or spirituality is generally associated with better mental health, research on the relationship between religiosity or spirituality and antenatal anxious symptoms is warranted.

Sample and methods

This study investigates the association of religiosity and spirituality with generalized anxiety in pregnant women who enrolled in a prospective study of risk factors for postpartum depression. Anxiety during pregnancy was assessed as a potential risk factor for postpartum depression but was also designated a priori as an important study outcome. The research protocol received institutional review board approval.

Study sites

Two obstetrics practices in a Southeastern U.S. state capital and one practice in a Gulf South state capital were chosen as study sites. The two sites in the Southeastern capital 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 Gulf South site is a large, urban and suburban private practice.

Participants

Women receiving prenatal care in late 2005 and early 2006 were recruited and provided with the written study questionnaires by nursing staff or a research assistant. The primary recruitment strategy was to enroll women when they initiated prenatal care, but women at all stages of prenatal care were eligible to enroll. All women receiving prenatal care who were at least 18 years old and able to speak and comprehend spoken English well enough to give informed consent and complete the study instruments were asked to participate. After an explanation of the aims and objectives of the study, written informed consent was obtained. Women completed the study instruments independently unless they requested assistance, in which case help was provided.

Measures

Six constructs of religiosity and spirituality were assessed: organizational religiosity, nonorganizational religiosity, intrinsic religiosity, daily spiritual experiences, self-rated spirituality, and self-rated religiousness. Organizational religiosity, nonorganizational religiosity, and intrinsic religiosity were assessed by the Duke Religion Index (Koenig et al. 1997; Hill and Hood 1999). The other measures were taken from the Fetzer Institute's Brief Multidimensional Measure of Religiousness/Spirituality (Fetzer Institute 1999).

Self-rated spirituality and religiosity were measured by four-point scales ranging from "very spiritual (or religious)" to "not spiritual (or religious) at all". The organizational and nonorganizational religiosity questions assessed how often participants (1) attended religious meetings (six-point response options ranging from "more than once a week" to "rarely or never") and (2) participate in private religious activities (six-point response options ranging from "more than once a day" to "rarely or never"). Intrinsic religiosity was measured by three questions about the centrality of religion in the participant's life, with five-point Likert scales ranging from "definitely true of me" to "definitely not true". The Daily Spiritual Experiences Scale consists of six questions that assess how frequently spiritual experiences (perceived interaction or involvement with God or the transcendent during daily life) occur, on a six-point scale ranging from "many times a day" to "never or almost never".

We anticipated that all or some of the religiosity and spirituality items might actually be measuring 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 and spiritual constructs could be combined into one or more measure(s) of religiosity and spirituality. All the measures loaded on one underlying factor (only one eigenvalue greater than one), which we call overall religiosity and spirituality. Overall religiosity and spirituality was calculated as standardized factor score (mean of 0 and a standard deviation of 1.0), and the factor explained 59.6% of the variance in the religiosity and spirituality measures. Cronbach's alpha was 0.69, and Pearson correlation coefficients between the six scales and the combined measure ranged from 0.70 to 0.84.

We considered social support to be an important covariate, since previous research shows it is inversely associated with symptoms of anxiety in pregnant women and it is hypothesized to be a means by which religiosity may affect mental health. Social support was measured with the Duke-UNC Functional Social Support Questionnaire (Broadhead et al. 1988). The University of North Carolina Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) version of the scale was used for this study (http://www.iprc.unc.edu/longscan/pages/measures/Baseline/i16.pdf). This version consists of seven items from the original scale that were found to be reliable and valid for measuring confident and affective support, plus three additional items developed by the LONGSCAN study

group for assessing instrumental social support. Each question is answered using a five-point Likert scale ranging from "as much as I would like" to "much less than I would like". The social-support score is calculated by summing the total of all responses.

Anxiety symptoms were assessed by the anxiety subscale of the HADS (Zigmond and Snaith 1983). This measure was designed to screen for anxiety disorders in medical patients. It consists of seven questions, graded on a four-point Likert scale from 0 to 3. A cutoff score above 10 (11 or greater) is recommended for detecting moderate to severe anxiety symptoms (Snaith and Zigmond 1999). The reliability and validity of the HADS are well established, and it has been used extensively in the literature (Snaith and Zigmond 1999; Bjelland et al. 2002).

We also measured depressive symptoms but used the Edinburgh Postnatal Depression Scale (EPDS) instead of the depression subscale of the HADS since the EPDS has been specifically validated for use in pregnant and postpartum women (Cox and Holden 2003). Consistent with prior research (Littleton et al. 2007), depression and anxiety scores were highly correlated ($r = 0.73$). The relationship between religiosity and spirituality and depressive symptoms in our sample has been reported elsewhere (Mann et al. 2008).

Additional independent variables

Participants were asked to identify their religion (Christian, Jewish, Muslim, Hindu, other, none). We also assessed a broad range of demographic and other characteristics. These included age, race, education level, marital status, a question about the quality of the relationship with the baby's father, number of children, previous pregnancy loss, desire for pregnancy, difficulty becoming pregnant, personal history of mental illness, current treatment for mental illness, family history of mental illness (in a first-degree relative), and study site.

Statistical analysis

Linear regression modeling (PROC GLM in SAS version 9.1; SAS Institute, Cary, N.C., 2002) was used to model anxiety (HADS) scores, with overall religiosity and spirituality as the primary independent variable. First, anxiety scores were modeled in univariable regression modeling with each of the independent variables. Then, variables that were statistically significant ($p < 0.05$) or approached statistical significance ($0.051 \leq p \leq 0.10$) were entered into a multivariable linear regression model. Variables that were not statistically significant were removed one at a time (backward selection) until every variable in the model was significant or approached statistical significance ($p < 0.10$). Variables were retained in the model even if they did not quite reach statistical significance because we wanted to account for the effects of these other, potentially important variables. Retaining these variables in the model was a conservative approach to testing whether the relationship between religiosity and spirituality and anxiety was independently significant.

To test whether religious and spiritual characteristics are associated with a positive screen for moderate to severe anxiety symptoms (HADS score of >10) we used the same model building approach, initially identifying variables that were significant or approached significance in univariable logistic regression, then putting those variables in a multivariable logistic regression model and eliminating nonsignificant variables using backward selection.

Results

Of the 404 women enrolled in the study, 312 participants were from the large, multiprovider Gulf South site, in addition to 73 from the Southeastern faculty practice and 19 from the Southeastern residents' clinic. The Gulf South site and the Southeastern faculty practice site had recruitment rates of over 85% of eligible patients. Recruitment was less successful at the "residents' clinic", as "no-shows" and patient flow problems were common; however, 19 of 57 eligible patients approached about the study agreed to participate.

Table 1. Characteristics of participants ($n = 344$)

Variable	Value
Mean (SD) age (yr)	28.3 (5.5)
Mean nr. (SD) weeks pregnant	9.7 (5.2)
Mean (SD) social-support score	43.6 (5.7)
Mean anxiety score	5.2 (3.4)
Site (nr. [%])	
SE residents	15 (4.4)
SE faculty	64 (18.6)
GS community	265 (77.0)
Race	
White	204 (59.3)
Black	129 (37.5)
Other	11 (3.2)
Marital/relationship status (nr. [%])	
Married	254 (73.8)
Living with partner	27 (7.9)
In relationship	51 (14.8)
No relationship	12 (3.5)
Education (nr. [%])	
<High school	5 (1.5)
High school	29 (8.4)
Some college	91 (26.5)
College degree	147 (42.7)
Graduate degree	72 (20.9)
Desire for pregnancy (nr. [%])	
Trying	164 (47.7)
Other	180 (52.3)
History of mental illness	
Yes	64 (18.6)
No	280 (81.4)
Religious attendance	
>Once a week	79 (23.0)
Once a week	106 (30.8)
A few times a month	89 (25.9)
Rarely or never	70 (20.4)
HADS anxiety score >10	23 (6.7)

Complete data for the anxiety scale and all the religiosity and spirituality measures were provided by 377 women. Of these usable observations, 317 had entirely complete data for all the other variables. However, a few items accounted for the majority of the missing data. Twenty-six participants omitted a single item on the social support scale. For these observations, the missing item was replaced with that woman's mean score on the other 9 social support questions. Ten women did not report their estimated gestational age. For these women, the number of weeks pregnant was estimated using the due date reported by the nurse and the date the questionnaire was administered (assuming an anticipated gestation of 280 days). These simple substitutions increased the number of usable surveys to 344, on which analyses were conducted.

Descriptive statistics for these 344 participants are provided in Table 1. Black and white women were well represented, while other races were rare. The women were generally well educated. As expected due to the recruitment strategy of approaching women primarily at their first prenatal visit, most (85%) of the women were in the first trimester of pregnancy (mean gestational age, 9.7). Nineteen percent of participants reported a history of mental illness, and almost 80% reported attending some kind of religious service at least a few times per month. Almost ninety percent of participants stated that they were Christian.

Not surprisingly, women from the residents' clinic were less likely to have a college degree (6%), more likely to be unmarried (94%), younger (mean age, 26), and less likely to be white (17%) than the sample as a whole. Women from the faculty practice and private practice were demographically similar (detailed data available from authors).

The scales used to measure religiosity, spirituality, social support, and anxiety all demonstrated good psychometric properties. Cronbach alpha coefficients were 0.81 for anxiety, 0.88 for social support, 0.90 for daily spiritual experiences, and 0.86 for intrinsic religiosity.

The mean HADS anxiety score was 5.2 of a possible 21. The mean was not significantly different for women in the first trimester compared to those later in pregnancy (5.3 versus 4.6, $p = 0.22$). Twenty-three women (7%) scored above the anxiety screening cutoff score. Ten (43%) of these women reported a history of mental illness.

Eight variables (age, race, overall religiosity and spirituality, social support, quality of relationship with the baby's father, history of mental illness, current treatment for mental illness, and family history of mental illness) were significantly associated with anxiety scores in univariable linear regression models. Study site was evaluated along with the other independent variables and was not significantly related to HADS-A scores.

Table 2. Linear regression modeling of HADS anxiety score[a]

Variable	DF	Parameter estimate	*F*	*P*
Age	1	−0.08	6.8	0.009
White race	1	0.58	2.8	0.095
History of mental illness	1	1.19	6.4	0.012
Treatment for mental illness	1	1.50	3.0	0.085
Social support	1	−0.19	39.0	<0.0001
Overall religiosity and spirituality	1	−0.53	9.9	0.002

[a] *R*-squared for the model is 0.228.

Age, race, overall religiosity and spirituality, social support, quality of relationship with the baby's father, history of mental illness, current treatment for mental illness, and family history of mental illness were placed in a multivariable linear regression model, with nonsignificant variables removed using backward selection until all the remaining variables were significant ($p < 0.05$) or narrowly missed statistical significance ($p < 0.10$). The final model explained 23% of the variation in anxiety scores. Age, social support, and overall religiosity and spirituality were significantly associated with lower anxiety scores. A history of mental illness was significantly associated with higher scores.

Overall religiosity and spirituality, quality of relationship with the baby's father, social support, history of mental illness, and current treatment for mental illness were significantly associated with the odds of a positive screen for moderate or severe anxiety (HADS-A, >10) in univariable logistic regression models. Desire for pregnancy narrowly missed statistical significance. Multivariable logistic regression using the same model building process produced a final model with two variables (overall religiosity and spirituality and social support) that were significantly associated with a HADS anxiety score greater than 10, and one variable (history of mental illness) that was retained in the model despite

Table 3. Logistic regression predicting positive screen for anxiety (HADS [anxiety], >10)[a]

Variable	OR	95% CI	*P*
Overall religiosity and spirituality	0.53	0.34, 0.84	0.006
Social support	0.42	0.28, 0.63	<0.0001
History of mental illness	2.29	0.86, 6.87	0.097

[a] The odds ratios for religiosity and spirituality and social support are scaled to represent the effect of a one standard deviation increase in the independent variable.

Table 4. Logistic regression, HADS anxiety of >10 by specific measures of religiosity and spirituality[a]

Variable	Min	Max	Mean	SD	Standardized OR[b]	95% CI	*P*
Organized religious participation	1	6	2.62	1.09	0.62	0.38, 1.07	0.055
Nonorganized religious participation	1	6	3.77	1.68	0.57	0.36, 0.90	0.017
Self-rated spirituality	1	4	3.23	0.75	0.62	0.39, 0.97	0.036
Self-rated religiosity	1	4	3.05	0.77	0.48	0.30, 0.77	0.002
Daily spiritual experiences	6	36	23.89	5.73	0.74	0.48, 1.14	0.166
Intrinsic religiosity	3	15	10.54	2.46	0.72	0.47, 1.09	0.119

[a] Each model adjusted for social support and history of mental illness.
[b] The OR is the odds ratio for a one standard deviation increase in the independent variable.

narrowly missing statistical significance. Odds ratios (OR) were calculated for a one standard deviation increase in the continuous independent variables to allow for straightforward comparisons of the magnitude of the association of each with odds of a positive screen. A one standard deviation increase in overall religiosity and spirituality was associated with a 47% relative reduction in the odds of a positive screen (OR, 0.53; 95% confidence interval [CI], 0.34–0.84). A one standard deviation increase in social support was associated with a 58% reduction in the odds of a positive screen (OR, 0.42; 95% CI, 0.28–0.63).

Though all the religiosity and spirituality variables loaded on a single factor, the different measures were not perfectly correlated. We wanted to examine the relative importance of each one as a predictor of a positive anxiety screen. To do so, we separately modeled the odds of a HADS anxiety score greater than 10 using each of the six specific measures of religiosity and spirituality. Social support and history of mental illness were included in each model. Three of the religiosity and spirituality measures were significantly inversely associated with the odds of screening positive for moderate to severe anxiety: self-rated religiosity (standardized OR, 0.48; 95% CI, 0.30–0.77), nonorganizational religious participation (standardized OR, 0.57; 95% CI, 0.36–0.90), and self-rated spirituality (OR, 0.62; 95% CI, 0.39–0.97). The other religiosity and spirituality measures were inversely associated with the odds of a positive screen but did not reach statistical significance.

Discussion

Our findings indicate that there is a significant inverse relationship between greater religiosity and spirituality and symptoms of anxiety in pregnant women. This finding supports previous research linking religiosity and spirituality with better mental health. No research on religiosity and spirituality and anxiety during pregnancy was included in a 2007 meta-analysis of anxious symptoms during pregnancy (Littleton et al. 2007), or in a 2004 critical review of studies on religion and anxiety (Shreve-Neiger and Edelstein 2004). Aside from a cursory mention of a significant inverse correlation between the Spiritual Perspective Scale and symptoms of anxiety in pregnant African American women, we believe this is the first study to demonstrate an association between religiosity and spirituality and decreased anxiety in pregnant women.

Williams et al. (1991) reported that religious attendance appeared to reduce the impact of stressful life events on psychological distress. A meta-analysis of religiosity and depression also found that the association was increased in study populations that were significantly stressed (Smith et al. 2003). Women with breast cancer (Feher and Maly 1999; Price et al. 2007) and, more salient to this study, women with high-risk pregnancies (Simon et al. 2007) have identified spirituality and/or religiosity as important aspects of their coping with these stressors. It is reasonable to hypothesize that religiosity and spirituality may reduce anxiety by providing a mechanism for pregnant women to cope with the stress of impending motherhood and of life in general. Religiosity may provide women with a belief in a powerful Deity who exerts ultimate control over life's uncertainties. Spirituality may provide a way to contextualize and find deeper meaning even in the face of difficult circumstances. The association between religiosity and spirituality and anxiety does not appear to be due to increased social support, since the relationship remained when controlling for social support.

One noted weakness of previous research on religiosity and spirituality and anxiety is the use of narrow (often one-dimensional) or unpublished measures of religiosity or spirituality (Shreve-Neiger and Edelstein 2004). The measurement of multiple domains of religiosity and spirituality with well-established measures is a strength of this study. It is interesting that all six measures loaded on a single underlying factor. Additional research may be warranted to determine whether differ-

ent domains of religiosity and spirituality are as closely linked in other samples of pregnant women.

Self-perceptions of religiosity and spirituality and frequency of private religious activities were the religiosity–spirituality variables most strongly associated with reduced odds of a positive anxiety screen. However, it is important to keep in mind that the OR for each religiosity–spirituality measure was in the expected direction (less than 1.0). The variability in domain-specific odds ratios may represent random variation; the point estimate for the least important religiosity–spirituality measure (daily spiritual experiences) was within the 95% CI for the most significant measure (self-rated religiosity). Research with larger sample sizes would likely be needed to adequately study the relative effects of different aspects of religiosity and spirituality.

This study has a number of limitations. First, the findings related to links between religiosity and spirituality and anxiety may or may not be generalizable to the entire pregnant population. The three study sites were selected on the basis of convenience and are all in the southern United States. In addition, recruitment was less successful in the residents' clinic that serves primarily lower income patients, so study participants on the whole were quite well educated. Thus, generalizability to less-educated women is questionable. To mitigate this problem, we reran the final linear regression model stratifying by education level (college degree or higher versus no college degree). Overall religiosity and spirituality was significantly inversely associated with anxiety score in both groups (data available on request).

Another limitation is that study participants were quite religious on average. This is consistent with the fact that the participants all reside in the American South, where both religious attendance and private prayer are more frequent than in most other regions of the country (National Opinion Research Center 2004). Further, according to a recent Gallup poll, the two states where this study was conducted are among the top four in the United States for frequency of religious attendance (Gallup Poll 2006). The relationship between increased religiosity and spirituality and lower levels of anxious symptoms may or may not extend to populations in which religion plays a less significant cultural role. The preponderance of people who identified themselves as Christian is representative of the United States as a whole. Though the large majority of Americans identify themselves as Christians, there is significant regional variation in denominational affiliation (Association of Religion Data Archives, http://www.thearda.com/internationalData/countries). We did not elicit information from participants related to denominational affiliation, so we cannot make any inference about the generalizability of the findings across denominations.

Third, we used a brief screening instrument (the HADS anxiety subscale) to assess self-reported symptoms of anxiety. The scale does not provide a clinical diagnosis of generalized anxiety disorder. Thus, misclassification of anxiety ''caseness'' is possible. Since both religiosity and spirituality and anxiety were measured using self-reports, it is possible that social-desirability bias influenced the results. That is, some participants may have been inclined to overstate their spirituality and understate their anxiety symptoms. Additional study using diagnostic interviews to assess anxiety and incorporating measurement of social-desirability bias would be worthwhile.

Finally, a cross-sectional study such as this cannot be used to make causal inferences. Study participants may have been less anxious because of their religious and spiritual beliefs and activities, or less-anxious people may take part in religious activities and endorse religious and spiritual beliefs more readily. On one hand, religion as a coping mechanism may reduce anxiety by providing meaning, purpose, and a sense of greater control (or decreased need for control). On the other hand, anxious women may avoid religious activities or have fewer spiritual experiences because of their anxiety.

An important next step is to test whether the associations identified in this study hold up in longitudinal studies (for example, does religiosity and spirituality influence the risk of new onset generalized anxiety or affect the course of generalized anxiety disorder in pregnant women), and whether they are generalizable to more diverse populations. If the findings hold true, they may have implications for clinicians in recognizing women at risk for antenatal anxiety and for program developers interested in creating interventions to prevent anxiety in pregnant women and/or assist those who are anxious.

Finally, this study emphasizes the need for healthcare providers to be alert to signs of anxiety in pregnant women even if there is no history of diagnosed mental illness, as over half of the women with moderate to severe anxiety on the basis of the HADS reported no psychiatric history. Since some young women may rarely receive health services except for obstetrical and gynecologic care, women's healthcare providers may be able to identify anxious or at-risk women before they would otherwise be recognized. On the basis of the findings of this study, clinicians may find it beneficial to ask

pregnant patients whether they have a religious or spiritual belief system and be particularly alert for symptoms of anxiety in those who do not. The same recommendation can be made with respect to social support.

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