Original Article

Religiosity, Spirituality, and Tobacco Use by Pregnant Women

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Background: Tobacco use during pregnancy is associated with adverse child outcomes. There is evidence that religiosity/spirituality is associated with less tobacco use. This study aims to investigate the association further, including an assessment of overall religiousness and specific aspects of religiosity/spirituality.

Methods: 404 pregnant women receiving prenatal care in three southern obstetrics practices were surveyed regarding religiosity/spirituality, other psychosocial characteristics, and recent tobacco use.

Results: Recent tobacco use was reported by 8% of study participants. In multivariable modeling, black race (OR = 0.32), social support (OR = 0.92), and overall religiousness (OR = 0.57) were significantly associated with lower odds of reporting recent tobacco use. Participation in organized religious activities and self-rated religiosity were the religious/spiritual measures most strongly associated with lower odds of tobacco use.

Conclusions: More religious/spiritual women appear to be less likely to use tobacco during pregnancy. Additional research is needed to investigate potential pathways for this association.

Key Words: pregnancy, tobacco, religion, spirituality

Tobacco use is associated with adverse pregnancy outcomes such as prematurity, low birthweight, spontaneous abortion, and infant mortality.[1–4] The effect appears to be without a threshold, as low birthweight, preterm birth, and infant mortality are increased even in women who smoke fewer than 6 cigarettes daily.[2,4] Maternal smoking may also be associated with long-term problems in children, such as attention deficit hyperactivity disorder,[5] criminal behavior,[6–8] and substance abuse.[8] Despite the risks, in 2004, 10.2% of pregnant women reported smoking during pregnancy.[9]

Recently, a large national study of smoking in the general population revealed that the likelihood of smoking decreased significantly as religious attendance increased.[10] Frequent attenders were approximately half as likely to smoke as infrequent attenders, and the association was present regardless of sex and race.

Two recent studies also demonstrate significant associations between religiosity and spirituality and smoking by pregnant women. The first was conducted in Appalachian women[11] and the second in African-American and low-income white women.[12] In both studies, religiosity (indicated by participant-rated importance of religious service attendance) was associated with decreased levels of smoking. Spirituality (assessed using the Spiritual Perspective Scale, which measures views and activities that provide a sense of transcendence and connectedness to a greater purpose) was significantly associated with lower levels of smoking in Appalachian women, but not in the African-American and low income white women.

The present study investigates the association of religious and spiritual characteristics with the likelihood of recent tobacco use among pregnant women at three clinical sites in the southern United States. The study represents a step forward from previous work because it includes a more in-depth assessment of religious and spiritual factors:

- Daily spiritual experiences
- Self-rated spirituality
- Frequency of public religious activities

Key Points

- Overall religiousness is associated with less tobacco use in pregnant women.
- Participation in organized religious activities and self-rated religiosity appear to be the most important of the religious and spiritual characteristics studied.
- Social support is also associated with less tobacco use.

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- Frequency of private religious activities
- Self-rated religiosity
- Intrinsic religiosity

Determining what aspects of religiosity/spirituality are most strongly associated with nonuse of tobacco is important for clinical consideration and may provide additional insight into the mechanisms through which religiosity and spirituality affect rates of tobacco use.

Methods

Two obstetrics practices in a southeastern capital and one obstetrics practice in a Gulf South 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/suburban private practice.

Women receiving prenatal care in late 2005/early 2006 were recruited for participation. Women were enrolled at their first prenatal appointment, though a few women missed at their first appointment were approached about the study when they returned for follow-up.

All women who were at least 18-years-old and able to comprehend English well enough to give informed consent and complete the study instruments were asked to participate. Women completed the written study instruments on their own unless they requested assistance, in which case help was provided.

Recent tobacco use was assessed using a single question: "Have you used tobacco (cigarettes, cigars, chewing tobacco, etc.) in the last seven days?" Women were asked their age, race and ethnicity, marital status, number of living children, whether they had ever experienced a pregnancy loss, educational level, and how many weeks they believed they had been pregnant. Education was assessed using five options ranging from "less than high school" to "graduate degree" but was later dichotomized as less than a college degree versus a college degree or more.

Participants were asked whether they were "trying to become pregnant at this time" and whether they had difficulty becoming pregnant. They were also asked to rate their relationship with the baby's father on a five-point scale, from excellent to very poor.

Depressive symptoms were assessed using the Edinburgh Postnatal Depression Scale[13] and symptoms of anxiety using the anxiety portion of the Hospital Anxiety and Depression Scale.[14] Women were also asked whether they had ever been diagnosed with depression, anxiety, or another mental illness.

Social support was assessed using the Duke/UNC Functional Social Support Questionnaire as modified by the University of North Carolina Longitudinal Study on Child Abuse and Neglect (LONGSCAN) group.[15,16] This 10 item instrument assesses social support using a 5-point Likert scale on items such as "I get people who care what happens to me" and "I get help when I'm sick in bed." Respondents rate whether these things happen "as much as I would like" to "much less than I would like." Possible scores range from 10 to 50.

Spirituality pertains to one's sense of connection to a transcendent power or purpose, with or without conformity to a set of prescribed beliefs or practices.[17] Spirituality was assessed using questions taken from the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS).[17] One question (self-ranking) asked participants to rate how spiritual they are, from very spiritual to not spiritual at all. The Daily Spiritual Experiences portion of the BMMRS comprises seven questions that assess how frequently the participant reports spiritual experiences such as "I desire to be closer to or in union with God" and "I am spiritually touched by the beauty of creation." Each item is scored on a 6-point Likert scale from "never or almost never" to "many times a day."

Religiosity pertains to one's involvement in a system of worship and doctrine that is shared within a group.[17] Self-rated religiosity was measured using a question from the BMMRS, which asked participants to rate themselves on a 4-point scale from "very religious" to "not religious at all." Frequency of religious attendance, frequency of private religious activities, and intrinsic religiosity were measured using the Duke Religion Index.[18] Organizational and nonorganizational religious participation were measured using 6-point Likert scales expressing the frequency of participation in public and private religious activities, from "rarely or never" to "more than once a day." Intrinsic religiosity, a measure of the degree to which one's religious beliefs and activities are viewed as important in their own right rather than means to some other end, were measured using 3 questions rated on a 5-point scale from "definitely true of me" to "definitely not true of me":

- "In my life, I experience the presence of the Divine."
- "I try hard to carry my religion over into all my other dealings in life."
- "My religious beliefs are what really lie behind my whole approach to life."

Of 404 women enrolled, 318 had entirely complete data. A few items accounted for most of the missing data. Twenty-six participants left blank 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 how many weeks pregnant they thought they were. For these women, the number of weeks pregnant was estimated using the estimated due date and the date the questionnaire was administered (assuming a 280 d gestation). Finally, 16 women left at least one item blank in the questions assessing personal history of depression, anxiety, or another mental illness. As long a woman answered "yes" or "no" to at least one item in the set, missing data for these questions were treated as "no" answers. These simple substitutions increased the number of usable surveys to 363.

Statistical Analyses

Analyses were conducted using SAS version 9.1. Means and frequency counts were tabulated for demographic characteristics and independent variables/covariates. Factor analysis was used to create a measure of overall religiousness based on the religiosity/spirituality measures. This continuous overall religiousness variable was standardized with a mean of 0 and a standard deviation of 1.

Predictors of recent tobacco use were analyzed using multivariable logistic regression. Every variable was entered into the model. The scaled variable for overall religiousness was used instead of the individual religiosity/spirituality variables. Backward elimination was used, eliminating nonsignificant variables until all remaining variables were at least marginally significant ($P < 0.10$). An alpha level of 0.10 was chosen to avoid eliminating potentially impacting variables that narrowly missed statistical significance. The likelihood ratio test was used to determine whether the eliminated variable(s) were appropriately excluded from the model. The final model was rerun, replacing overall religiousness with each individual measure of religiosity/spirituality to determine which religious/spiritual characteristics are most important.

Results

Four hundred and four women enrolled in the study. All responded to the question regarding recent tobacco use, with 34 reporting using tobacco in the previous seven days. Three hundred twelve of the participants were from the large, multiprovider Gulf South site, 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. Personal information was not collected from study refusals, but the participants from the residents' clinic appear to be representative of the patient population. The racial distribution of patients served at the clinic is approximately 20% non-Hispanic white, 50% non-Hispanic African-American, and 30% Hispanic. Only 20% of patients have private insurance (approximately 50% are insured by Medicaid and another 30% are uninsured). Of the 19 participants from the residents' clinic, 16 were African-American and 3 were white. No Hispanic women were enrolled from the site, but 14 women were excluded because they did not speak English. Only 1 participant from the residents' clinic reported having a college degree, and only 1 was married.

Modeling was performed on 363 observations. Descriptive statistics are provided in Table 1. Black and white women were well represented, while other races and Hispanic ethnicity were rare. The women were generally well educated. As expected, most participants were in the first trimester of pregnancy.

Table 1. Characteristics of participants

Variable	Number (%)	Mean (SD)
Age		28.4 (5.5)
Weeks pregnant		9.7 (5.2)
Race		
White	219 (60.3)	
Black	130 (35,8)	
Other	14 (3,9)	
Ethnicity		
Hispanic	14 (3,9)	
Non-Hispanic/Not provided	349 (96.1)	
Marital status		
Married	271 (74.7)	
Unmarried	92 (25.3)	
Education		
<College degree	132 (36.4)	
College degree	231 (63.6)	
Religious attendance		
Twice a week or more	84 (23.2)	
Once a week	113 (31.1)	
A few times a month	91 (25.1)	
Rarely or never	75 (20.7)	
Tobacco use		
Yes	29 (8.0)	

Twenty nine (8%) of the 363 women reported using tobacco in the previous 7 days. Results of the multivariable logistic regression modeling are shown in Tables 2 and 3. Black race (OR = 0.32), social support (OR = 0.92 for each one point increase in social support score), and overall religiousness (OR = 0.57) were the only variables that were statistically significant. Reported history of anxiety (OR = 2.40) was marginally significant ($P = 0.069$) (Table 4).

We reran the final multivariable model six times, each time replacing overall religiousness with one of the religiosity/spirituality variables. Organizational religious participation, private religious activities, self-rated religiosity, and self-rated spirituality were each significantly associated with nonuse of tobacco when controlling for race, social support, and history of anxiety. Intrinsic religiosity and daily spiritual experiences were marginally significant. Organizational religious participation was the most highly significant of the religiosity/spirituality variables (OR = 0.49, 95% CI 0.32, 0.75), followed by self-rated religiosity (OR = 0.46, 95% CI 0.27, 0.78). Because the religiosity/spirituality measures are scaled differently, Table 3 also shows the odds ratio for a one standard deviation increase in each measure.

Discussion

The proportion of women reporting recent tobacco use is similar to, though slightly lower than, recent statistics, which

Table 2. Full logistic regression model predicting recent tobacco use

	OR	*P*
Overall religiousness	0.64	0.03
Social support	0.93	0.08
Black race	0.17	0.01
Other race, not white or black	0.46	0.51
Hispanic ethnicity	0.40	0.44
Depression score	0.95	0.47
Anxiety score	1.09	0.30
Residents' clinic	1.74	0.65
Faculty site	1.75	0.28
College degree	0.93	0.90
Age	1.04	0.40
Prior pregnancy loss	1.50	0.43
Number of children	0.74	0.31
No. weeks pregnant	1.06	0.20
Quality of relationship with baby's father	0.75	0.42
Married	0.52	0.30
Trying to become pregnant	0.48	0.19
Difficulty becoming pregnant	1.80	0.38
History of depression	1.42	0.53
History of anxiety	2.33	0.16
History of another mental illness	0.37	0.45

show a national prevalence of smoking during pregnancy of 11.5% (12–13% in the two states where the study sites are located).[19] Those data are based on birth certificate reports of smoking while pregnant, whereas our study assesses tobacco use specifically in the previous 7 days. Thus, the present study represents essentially a point prevalence estimate, compared with the period prevalence estimate provided by birth certificate data. The high proportion of college graduates in the study sample also helps explain the somewhat lower than expected level of tobacco use, as more educated women are less likely to smoke during pregnancy.[12,20–22]

The inverse association between social support and tobacco use supports prior research demonstrating an association between psychosocial variables like stress and low social support with tobacco use in pregnant women.[11,23,24] The lower prevalence of tobacco use among black women is consistent with the most recently available national data (13.8% in non-Hispanic white women versus 8.4% in non-Hispanic black women).[9]

Table 3. Predictors of tobacco use, final model

	OR	95% Confidence interval	*P*
Black race	0.32	0.10, 0.97	0.043
Social support	0.92	0.87, 0.98	0.012
Overall religiousness	0.57	0.39, 0.83	0.003
History of anxiety	2.40	0.94, 6.14	0.069

The inverse association between overall religiousness and tobacco use also supports previous findings. In our data, the association is quite strong; a one standard deviation increase in overall religiousness was associated with a greater than 40% reduction in the odds of recent tobacco use. It is intriguing that, while every measure of religiosity/spirituality was at least marginally associated with reduced odds of tobacco use, organizational religious participation (attendance) and self-rated religiosity are more strongly associated with reduced odds of tobacco use than importance of religion in a woman's life (intrinsic religiosity) or spiritual experiences.

Unlike subjective measures of values or experiences, organized religious involvement provides opportunities for repeated contact with a community of congregants who may feel entitled or even obligated to discuss the risk of tobacco use by a pregnant woman. However, the impact of religious attendance in our findings is independent of social support, implying that the association is not strictly socially mediated. Religious women may hear sermons and scripture lessons addressing topics (like concern for others and the importance of being a good parent) that encourage a mother-to-be to avoid tobacco use. Furthermore, religious adherents may believe that they are obligated to do what they can to remain healthy so they may be effectively used by God.

Several important caveats must be kept in mind regarding this study. First, participants were recruited from three obstetrics practices, selected by convenience, in the southern United States. The results may not be generalizable to other geographic areas. Second, while black and white women are well represented, other races and Hispanic ethnicity are rare. In addition, study participants were generally quite religious and highly educated. The high level of religiosity is consistent with the fact that the participants all reside in the South, where both religious attendance and private prayer are more frequent than in most other regions of the country.[25] The high educational level is at least partly due to the difficulties in enrolling women from the "residents' clinic," which serves primarily low income women.

Our findings may be the result of residual confounding; self-reported religious involvement and abstinence from tobacco could be related to one or more underlying personal characteristics, such as a desire to conform to social norms. Research shows that pregnant smokers fail to report tobacco use approximately 25 to 30% of the time,[26–28] though we know of no evidence that nondisclosure of tobacco use is associated with religiosity/spirituality. Finally, as with any cross-sectional study, it is impossible to assign a temporal sequence to the observed associations.

With those caveats in mind, the principal findings of this study–that increased religiousness and increased social support are associated with a reduced likelihood of tobacco use

Table 4. Logistic regression, recent tobacco use by specific measures of religiosity/spirituality*

	Mean	SD	OR	95% CI	*P*	Standardized OR**
Organized religious participation	2.58	1.10	0.49	0.32, 0.75	0.0008	0.46
Nonorganized religious participation	3.77	1.67	0.77	0.61, 0.97	0.029	0.64
Self-rated spirituality	3.21	.75	0.59	0.35, 0.99	0.047	0.67
Self-rated religiosity	3.04	.76	0.46	0.27, 0.77	0.0035	0.55
Daily spiritual experiences	23.82	5.82	0.94	0.88, 1.00	0.053	0.70
Intrinsic religiosity	10.53	2.50	0.89	0.77, 1.02	0.098	0.74

**Each model is adjusted for social support, race, and history of anxiety.*

***The Standardized OR is the odds ratio for a one standard deviation increase in the independent variable.*

in pregnant women–are important. From a community health perspective, social circumstances in which there are greater opportunities for building strong social ties may help prevent pregnant women from smoking. Communities of faith would appear to be an important part of this healthful social milieu. Faith communities may also provide good venues for effective smoking cessation interventions. Two studies have demonstrated that smoking cessation programs conducted through churches can have positive effects,[29,30] though neither study utilized a design that permits comparison of effectiveness of smoking cessation programs in religious versus nonreligious settings.

For healthcare providers, this study provides additional evidence that religiosity and spirituality are important correlates of good health. While many physicians believe that spiritual well-being is important for health and that inquiring about patients' spiritual beliefs is important, spiritual discussions with patients are rare in practice.[31–35] Meanwhile, in most studies, a majority of patients believe physicians should inquire about their spiritual beliefs.[36–40] It would be disingenuous for a physician to encourage or expect a patient to "become more spiritual/religious" for the sake of tobacco cessation. However, it seems reasonable to initiate a nonjudgmental discussion of a woman's religious/spiritual beliefs and how they might relate to tobacco use in pregnancy. It also seems appropriate to encourage pregnant tobacco users who have religious/spiritual beliefs to discuss tobacco cessation with a pastor or spiritual advisor.

Additional research is needed on the pathways through which religious/spiritual characteristics are associated with lower likelihood of tobacco use during pregnancy and whether this relationship is due to decreased preconception tobacco use, more frequent cessation following conception, or both. Studies comparing tobacco cessation programs and clinical counseling that incorporate religious/spiritual themes to standard cessation approaches may also be warranted.

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